

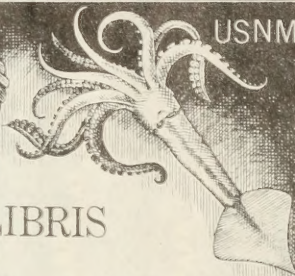
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CATALOGUE OF MARINE MOLLUSCA

ADDED TO THE FAUNA OF NEW ENGLAND

DURING THE PAST TEN YEARS.

WITH PLATES XLII-XLIV, LVII, LVIII.

BY A. E. VERRILL.

[FROM THE TRANSACTIONS OF THE CONNECTICUT ACADEMY, VOL. V, PART 2.]

NEW HAVEN, APRIL TO JULY, 1882.

CATALOGUE OF MARINE MOLLUSCA ADDED TO THE FAUNA OF THE
NEW ENGLAND REGION, DURING THE PAST TEN YEARS. BY
A. E. VERRILL.

THE following catalogue is intended to include all the Mollusca now known to inhabit the New England region that are not included in Binney's edition of Gould's Invertebrata of Massachusetts, published in 1870.

In the "New England Region" I include, on the north, the coasts of Nova Scotia and New Brunswick, and their outlying banks; while on the south, I include the entire region, about 100 to 120 miles wide, between the shore and the Gulf Stream, off the southern coast of New England, and embracing all depths down to 600 fathoms.* I have also included the free-swimming and floating forms, ordinarily inhabiting the same region, which may be considered as meeting and including the innermost edge of the Gulf Stream in summer, but most of these surface forms are usually to be found, in summer, far inside of the actual limits of the Gulf Stream. The Grand Banks of Newfoundland and the northern parts of the Gulf of St. Lawrence I have considered as extra-limital, for my present purposes. Those localities are inhabited by an extremely arctic fauna, including many species of mollusca that have not yet been found farther south. Among these are several species of *Buccinum* and allied genera. Some of these I have indicated in the following list, for convenience of reference, but have put their names in italic type to distinguish them from those considered as more properly belonging to the New England region, which are put in black-faced type. A few species that were known to inhabit New England, before the publication of Binney's Gould, but were erroneously omitted from that work, are also introduced into this list, in italic type.

No attempt is here made to give the complete, nor even the general synonymy of the well-known species. Except in special cases, only those references are given which are necessary to show the origin of the name adopted, together with references to at least one accessible work where a description or figure may be found.†

* Descriptions of the special features of this off-shore region may be found in the Amer. Journ. Science, vol. xx, p. 390, Nov., 1880; vol. xxii, p. 292, Oct., 1881; and Proc. National Museum, for 1880, p. 356.

† In this connection it gives me pleasure to highly commend the excellent recent work of G. O. Sars, viz: Mollusca Arcticæ Norvegiæ. This is almost a manual for the northern New England Mollusca, and contains a profusion of accurate illustrations.

Table of Outer Stations occupied by the "Fish Hawk" in 1880 and 1881.

Stat.	Locality.		Fath.	Bottom.	Date.	Temperature.		Hour.
						Bottom.	Surface.	
Off Martha's Vineyard and Newport, R. I.								
	N. Lat.	W. Long.			1880.	F.	F.	
865	40° 05' 00"	70° 23' 00"	65	fine com. sand	Sept. 4	73°		5.40 A. M.
866	40 05 18	70 22 18	65	"	"	73		6.30 "
867	40 05 42	70 22 06	64	"	"	53°	73	7.04 "
868	40 01 42	70 22 30	162	"	"	47	75	8.23 "
869	40 02 18	70 23 06	192	mud, fine sand	"		76	9.27 "
870	40 02 36	70 22 58	155	fine sand, mud	"		77	10.50 "
871	40 02 54	70 23 40	115	"	"	49	76.5	11.40 "
872	40 05 39	70 23 52	86	shells, sponges	"	50.5	77	12.45 P. M.
873	40 02 00	70 57 00	100	fine sand, mud	Sept. 15	51	69.5	5.36 A. M.
874	40 00 00	70 57 00	85	"	"	51	70	6.26 "
875	39 57 00	70 57 30	126	"	"	53	70	7.51 "
876	39 57 00	70 56 00	120	"	"	53	70	8.45 "
877	39 56 00	70 54 18	126	"	"		71	9.40 "
878	39 55 00	70 54 15	142½	"	"	52	71	11.00 "
879	39 49 30	70 54 00	225	"	"	42	71.5	1.20 P. M.
880	39 48 30	70 54 00	252	mud, fine sand	"	43	71.5	3.12 "
881	39 46 30	70 54 00	325	mud	"	42	71	5.00 "
891	39 46 00	71 10 00	500	mud, fine sand	Oct. 2		67	6.00 A. M.
892	39 46 00	71 05 00	487	mud, f. sd. st.	"		65	8.46 "
893	39 52 20	70 58 00	372	"	"	40	64	11.23 "
894	39 53 00	70 58 30	365	fine sand	"	40	64	1.10 P. M.
895	39 56 30	70 59 15	238	f. sand mud	"	42	65	3.17 "
Off Chesapeake Bay.								
896	37° 26'	74° 19'	56	sand, shells	Nov. 16			
897	37 25	74 18	157½	sand, mud	"			
898	37 24	74 17	300	mud	"			
899	37 22	74 29	57½	sand	"			
900	37 19	74 41	31	"	"			
901	37 10	75 08	18	"	"			
Off Martha's Vineyard.*								
	S. ½ W.	59½ m.			1881.			
917	½		43	green mud	July 16	42° F.	63° F.	4.10 A. M.
918	"	61 "	45	"	"	45	63	5.33 "
919	"	65 "	51½	"	"	42.5	66	7.00 "
920	"	68½ "	61	"	"	49	66	8.20 "
921	"	73 "	65	"	"	52	70	9.40 "
922	"	77 "	69	green m., sand	"	52	72	10.57 "
923	"	78½ "	96	sand	"	52	72	12.27 P. M.
924	"	83½ "	160	"	"	44.5	71	1.52 "
925	"	86 "	224	sand, mud	"	42	71	3.35 "
926	"	85 "	195	"	"	44	71	5.24 "
935	S. by E. ½ E.	106½ m.	770		Aug. 4	39.5	70	8.14 A. M.
936	"	104½ "	705	mud	"	39.5	71	10.43 "
937	"	102 "	506	green sd., mud	"	40.5	72	12.45 P. M.
938	"	100 "	310	"	"	42	72.5	2.44 "
939	"	98 "	258	"	"	47	73	4.25 "
940	"	97 "	130	sand	"	52	72	5.30 "
941	"	89½ "	76	sand, mud	"	52	71	7.45 "
942	S. by W. ¾ W.	81½ "	134	"	" 9	50	69	6.15 A. M.
943	S.S.W.	83 "	153	sand, m., shells	"	49	70	7.10 "
944	"	82 "	124	"	"	51	70	8.27 "

* The distances are measured from Gay Head Light, in geographical miles. The bearings are magnetic.

Table of Outer Stations occupied by the "Fish Hawk" in 1880 and 1881.

Stat.	Locality.	Fath.	Bottom.	Date.	Temperature.		Hour.
					Bottom.	Surface.	
945	S. by W. $\frac{3}{4}$ W. 84 $\frac{1}{2}$ m. . .	202	green m., sand	Aug. 9	44° F.	71° F.	12.05 P. M.
946	" " 87 $\frac{1}{2}$ " . .	241	" "	"	47	71	2.00 "
947	" " 89 " . .	312	sand, mud	"	44	70	4.00 "
949	S. 94	79 $\frac{1}{2}$ " . .	yellow mud	" 23	52	66	4.20 A. M.
950	" " 75 " . .	69	sand, sh., mud	"	52	65	5.50 "
951	" " 85 " . .	219	mud	"	41	67.5	9.40 "
952	S. $\frac{1}{4}$ E. 87 $\frac{1}{2}$ " . .	388	yellow m., sand	"	40	68	11.28 "
953	S. $\frac{1}{2}$ E. 91 $\frac{1}{2}$ " . .	715	mud	"	39.5	68	2.30 P. M.
954	" " 91 " . .	642	sand, mud	"	39.5	68	4.50 "
994	S.S.W. $\frac{1}{4}$ W. 104 $\frac{1}{2}$ " . .	368	mud	Sept. 8	40.5	68	4.50 A. M.
995	" " 104 $\frac{1}{2}$ " . .	358	yellow m., sand	"	40.5	68	6.32 "
996	" " 104 " . .	346	" "	"	40	67.5	7.35 "
997	" " 103 $\frac{1}{2}$ " . .	335	yellow mud	"	40	67.5	9.03 "
998	" " 102 $\frac{1}{2}$ " . .	302	green mud	"	40	68	10.34 "
999	" " 100 " . .	266	" "	"		68	11.48 "
1025	S.S.W. $\frac{1}{4}$ W. 95 " . .	216	" "	"	45	69	1.05 P. M.
1026	" " 93 $\frac{1}{2}$ " . .	182	" "	"	47.5	69	2.55 "
1027	S.S.E. $\frac{3}{4}$ E. 105 $\frac{1}{2}$ " . .	93	fine sand	" 14	48 $\frac{1}{2}$	65	7.23 A. M.
1028	" " 108 $\frac{1}{2}$ " . .	410	yellow mud	"	41	66	9.01 "
1029	" " 109 $\frac{1}{2}$ " . .	458	" "	"	40	68	12.13 P. M.
1030	" " 108 $\frac{1}{2}$ " . .	337	" "	"	41	66	1.52 "
1031	" " 107 $\frac{1}{2}$ " . .	255	" "	"	46	65	2.54 "
1032	" " 107 " . .	208	" "	"	46	65	4.00 "
1033	" " 106 " . .	183	sand, gravel	"		63	4.55 "
1034	" " 105 $\frac{1}{2}$ " . .	146	sand, y. mud	"	46 $\frac{1}{2}$	62	5.55 "
1035	" " 103 $\frac{1}{2}$ " . .	120	sand	"	47	62	6.56 "
1036	" " 102 " . .	94	" "	"	51	61 $\frac{1}{2}$	7.54 "
N. Lat.		W. Long.					
1038	39° 58'	70° 06'	146	sand, shells	" 21	47	67
1039	39 59	70 06	136	"	"	50	67
Off Delaware Bay.							
1043	38° 39'	73° 11'	130	sand	Oct. 10	49	65 $\frac{1}{2}$
1044	38 37	73 12	224	gray mud	"	42 $\frac{1}{2}$	66
1045	38 35	73 13	312	"	"	40	66
1046	38 33	73 18	104	sand	"	51	66
1047	38 31	73 21	156	"	"	49	66
1048	38 29	73 21	435	mud	"	40	66
1049	38 28	73 22	435	"	"	40	66

In giving the distribution, on our coast, or in foreign waters, only a general statement of the range is usually made, for a very detailed paper is now in preparation,* on the distribution of our mollusca, in which all the available information of this kind will be given in the form of tables, and illustrated by charts.

As it will be necessary to refer very frequently to the stations, occupied by the "Fish Hawk," while dredging in the deeper waters off the southern coast of New England, for the U. S. Fish Commission, in 1880 and 1881, I give here a table of those stations.

* By Mr. Sanderson Smith and the writer, for the U. S. Fish Commission.

CEPHALOPODA.

DECACERA.

Teuthidea Verrill. (See p. 427.)

Lestoteuthis Fabricii (Licht.) Verrill (pp. 291, 293, 387, 390).

Sthenoteuthis megaptera Verrill. (pp. 223, 286).

Architeuthis Harveyi Verrill. (pp. 177-210, 259, 395, 422).

Architeuthis princeps Verrill. (pp. 181-189, 194, 259).

Mustigoteuthis Agassizii Verrill. (p. 297).

Chiroteuthis lacertosa Verrill. (pp. 299, 408).

Brachioteuthis Beanii Verrill. (p. 406).

Calliteuthis reversa Verrill. (p. 295).

Histioteuthis Collinsii Verrill. (pp. 234, 300, 404).

Taonidea Verrill. (See p. 431).

Desmoteuthis hyperborea (Steenst.) Verrill. (p. 302).

Desmoteuthis tenera Verrill. (p. 412).

Sepiolidea Verrill. (See p. 434).

Stoloteuthis leucoptera Verrill. (pp. 347, 418).

Rossia megaptera V. (p. 349).

Rossia Hyatti V. (p. 351).

Rossia sublevis V. (pp. 354, 419).

Heteroteuthis tenera V. (pp. 357, 419).

OCTOPODA Leach. (See p. 360).

Parasira catenulata Steenst. (p. 362).

Argonauta argo Linné. (pp. 364, 420).

Alloposus mollis Verrill. (pp. 366, 420).

Octopus Bairdii Verrill. (pp. 368, 421).

Octopus lentus Verrill. (p. 375).

Octopus piscatorum Verrill. (p. 377).

Octopus obesus Verrill. (p. 379).

Eledone verrucosa Verrill. (p. 380).

Stauroteuthis syrtensis Verrill. (p. 382).

GASTROPODA.

TOXOGLOSSA.

Pleurotoma Dalli Verrill and Smith, sp. nov.

PLATE LVII, FIGURES 1, 1a.

A slender, transversely ribbed species, remarkable for the deep notch, widest within, and the deeply concave subsutural band.

Whorls ten, somewhat angular and shouldered; nucleus smooth, rather large, subglobular, of about one and a half whorls, as broad as the next whorl, the first nuclear half-whorl is nearly covered by the next, the surface is glossy, marked on the lower half-whorl with rather indistinct spiral lines, which become more distinct on the next whorl. All the remaining whorls, except sometimes the last, are crossed by strongly marked, somewhat oblique, angular ribs, which are most elevated at the shoulder, below the strongly marked, concave, subsutural band; they do not extend on this band, and mostly fade out below, before reaching the suture; on the body-whorl the ribs are less distinct and sometimes absent, when present they extend only a little below the suture. The whole surface is covered with fine, wavy, spiral lines; fine, but rather conspicuous, lines of growth cover the surface, and recede strongly on the subsutural band.

Aperture small, ovate, rather narrow. Outer lip with a prominent, convex edge, which has a deep notch, situated a short distance below the suture. The notch is usually constricted or even nearly closed up at the edge of the lip, but is broadly rounded at its inner end; this gives it a button-hole like appearance. In some specimens it is but little constricted. Canal short, broad, slightly everted.

Color, brown of various tints; often deep brown, with one or two spiral bands of yellowish brown, and with streaks of light brown; or the ribs may be pale yellowish brown; aperture brown within; columella whitish in front. Animal not seen. Operculum not observed.

Length of the largest specimen, 19.5^{mm}; greatest diameter, 6^{mm}; length of body-whorl and canal, 10^{mm}; of aperture, 6^{mm}; breadth of aperture, 2.5^{mm}.

Off Martha's Vineyard, stations 1035, 1036, 1038, 1039, in 94 to 146 fathoms, 1881. Off Delaware Bay, station 1046, 104 fathoms, dredged by Lieut. Z. L. Tanner, Oct. 10, 1881.

This very curious and handsome species we have dedicated to Capt. W. H. Dall, of the U. S. Coast Survey, who has done much for American malacology.

Pleurotoma Carpenteri Verrill and Smith.

Pleurotoma Carpenteri Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 391, 395, Nov., 1880; Verrill, Proc. U. S. Nat. Mus., p. 368, 1880.

PLATE LVII, FIGURE 2.

Shell rather small, solid, slender; surface glossy, without spiral lines, but with distinct lines of growth. Whorls eight, somewhat convex, scarcely shouldered, crossed by about twelve strong, elevated, decidedly flexuous, smooth, rounded, longitudinal ribs, which are highest just below the subsutural band, and extend entirely across the upper whorls, and on the body-whorl from near the suture to the middle, below which the surface is smooth; the interstices between the ribs are deeply concave, wider than the ribs, and perfectly smooth, except for the faint, but evident, lines of growth. Nucleus rounded, without sculpture, shining white. Outer lip thin, the edge sharp, projecting forward and rounded in the middle, with a broad, rounded sinus, a little below the suture. Aperture rather small, oblong-ovate; canal short, straight, a little narrowed by an incurvature of the lip, at its base; columella nearly straight, thickened by a layer of enamel, which forms externally a distinct ridge, or margin. Color, white or pale yellow, often with darker brownish orange ribs. Length, 7; breadth, 2.75^{mm}. Animal not seen.

Only a few specimens were taken in 1880, at stations 870 to 873, in 86 to 155 fathoms. Several were dredged in 1881, at station 949, in 100 fathoms.

Pleurotoma comatotropicis Dall.

Pleurotoma (Mangilia) comatotropicis Dall, Bulletin Mus. Comp. Zool., ix, p. 58, 1881.

Differs from all our other species in having strong spiral ribs and grooves on the lower whorls.

One dead specimen. Off Martha's Vineyard, station 949, in 100 fathoms. Off Cape San Antonio, 640 fathoms (Dall).

Daphnella limacina Dall.

Pleurotoma (Bela) limacina Dall, Bulletin Mus. Comp. Zool., ix, p. 55, 1881.

Pleurotoma (Daphnella?) limacina Verrill, Amer. Journ. Sci., xxii, p. 300, Oct., 1881.

Daphnella limacina Dall, op. cit., p. 102.

Shell delicate, translucent, glassy white, ovate-fusiform, acute at both ends. Whorls nine, slightly convex, with a small, nodulous,

subsutural shoulder. Nucleus small, brown, acute, of three whorls, which are obliquely sculptured. Other whorls polished and shining, but, in some lights, often showing faint, microscopic, oblique lines, and lines of growth; the nodules below the sutures are smooth and rounded, small, and separated by intervals about equal to their breadth; canal with a few spiral lines close to tip. Aperture fusiform; notch broad; canal short, narrowed to the end. Length, 9.5^{mm}; greatest breadth, 4.5^{mm}; length of body-whorl and canal, 6^{mm}; of aperture, 4.75^{mm}; breadth of aperture, 2^{mm}.

Four living specimens of this elegant shell were taken off Martha's Vineyard, at station 994, in 368 fathoms. Gulf of Mexico, 447–805 fathoms (Dall).

This species has no operculum; the eyes are minute. It is, therefore, not a *Bela*, as Mr. Dall admitted, after examining an alcoholic specimen, sent by me for comparison with his type. I have also had an opportunity to compare his specimens with my own.

Pleurotomella Verrill.

Amer. Journ. Sci., v, p. 15, Dec., 1872.

Shell elongated, with a high spire. Whorls usually angulated or shouldered; a large, concave, subsutural band; and usually with transverse sigmoid ribs. Canal slightly produced. Lip with a distinct, often deep notch, just below the suture. Operculum absent. Eyes none. Tentacles well-developed. Uncini nearly as in *Bela*.

Type, *P. Packardii* Verrill.

Pleurotomella Packardii Verrill.

Pleurotomella Packardii Verrill, Amer. Journ. Sci., v, p. 15, Dec., 1872; Trans. Conn. Acad., iii, p. 48, 1874.

PLATE XLIII, FIGURE 9; PLATE LVII, FIGURE 5.

The later examples are all smaller than the original type (fig. 9), but agree with it closely, in sculpture, except that some of the younger examples have the spiral lines coarser and more prominent, while the subsutured band is crossed by well-marked, strongly curved riblets. Some young shells have the transverse costae so prominent as to give the whorls a decidedly angulated or shouldered appearance. The two nuclear whorls are small, deep chestnut-brown, minutely decussated by fine oblique lines. The normal sculpture begins on the next whorl.

The color of all the specimens is delicate, pale, yellowish brown, or salmon, nearly uniform throughout, except for the darker brown nucleus.

The tentacles are tapered, with a swelling on the outer side, near the base, but have no eyes; the penis is very large and long, round, nearly cylindrical, except near the tip, where it tapers; in alcoholic specimens it is nearly as thick as the neck, from which it arises.

The uncini of the odontophore are long-lanceolate, acute, with a tooth on one side, near the middle, but without terminal barbs; basal process (manubrium) large, somewhat bilobed.

An immature female has the whorls somewhat more convex and more evenly rounded, or less shouldered, and the transverse ribs smaller and less elevated than in the example originally described, which was a male, (fig. 9). In this female, the spire is also slightly less acute, but otherwise the shell does not differ in the two sexes. The length of this specimen is 13^{mm}; greatest breadth, 6; canal and body-whorl, in front, 9.5. The original male is 21.5^{mm} long, 11.5 broad; canal and body-whorl, 15^{mm} long.

This shell is much thinner and far more delicate than the two following species, from which it also differs in having a much deeper sinus, more convex whorls, a narrower canal, and much finer sculpture.

Gulf of Maine, 110 fathoms (S. 89, Bache), 1872; 105 and 110 fathoms (S. 51, 54, B.), 1874; 85 fathoms (S. 189), 1878; off Cape Cod, 96 fathoms (S. 378), 1879.

Pleurotomella Agassizii Verrill & Smith.

Pleurotoma (Pleurotomella) Agassizii Verrill & Smith, Amer. Journ. Sci., xx, p. 394, for Nov., 1880 (published Oct. 25); Verrill, Proc. U. S. Nat. Mus., iii, p. 367, 1880.

PLATE LVII, FIGURES 3, 3a.

Shell rather large and solid; whorls eight or nine, convex, angularly shouldered, with sixteen to eighteen thick, rounded, oblique ribs, separated by concave interspaces; the ribs do not extend above the shoulder, leaving a rather broad, flattened, or concave, subsutural band, which is covered by fine, raised, revolving lines, more or less decussated by distinct lines of growth, and by many curved riblets, running down from the suture; the revolving lines become stronger, more elevated, and wider apart below the shoulder, and cross the ribs as well as their intervals; toward the base of the canal the ribs

fade out and the revolving lines become still more prominent, some of them often dividing, but on the canal they again become smaller and closer. The two nuclear whorls are very small, chestnut-brown, scarcely carinated, rounded, with the surface finely reticulated by lines running obliquely, in two directions, but close to the suture only the transverse lines appear. Outer lip with a wide and rather deep rounded sinus, a little below the suture; below this it curves strongly forward, and recedes again at the canal, which is rather short, narrowed, and a little excurved. Columella smooth, with a sigmoid curve, and obliquely narrowed at the canal. Aperture subovate, sinuous, rather large but narrow. Shell usually white when fresh, sometimes pink or pale yellow, often stained with dark ash-gray, even while still living; the columella is usually more or less deeply tinged with brownish red, or orange-brown, but is often white.

Uncini numerous, small, slender, oblong-linear, very acute, twisted close to the tip, scarcely barbed; base yellow, relatively large, thick, saddle-shaped, with two large subequal lobes and a smaller one, and with a long, pyriform appendage about one-fourth as long as the shaft. Length of the uncini, $\cdot 0166^{mm}$; of shaft, $\cdot 0104^{mm}$; diameter of shaft, $\cdot 0012$; breadth of base, $\cdot 0034$.

Length, of an average specimen, 31^{mm} ; breadth, 14^{mm} ; length of aperture, 16^{mm} ; breadth, 6^{mm} .

There is considerable variation in the proportions of the shells. In some specimens the spire is much longer and more slender than usual, and the whorls are flatter. In others, the shell is stouter, with a shorter and less acute spire. Among the shorter-spined ones I have found both sexes, but the females are more generally of this form, while the males are usually of the more elongated form.

One of the most elongated specimens is 30.5^{mm} long; 12 broad. One of the stoutest is 26^{mm} long; 13 broad. These are both dry shells, and the sex is not known. An ordinary male is 24^{mm} long; 10 broad. A female, of the longer form, is 26^{mm} long; 12 broad.

The animal, in alcohol, has a rather small head, with small, short, obtuse tentacles, slightly swollen at base, but without eyes. The penis is unusually small, and very much smaller than in *P. Packardii*; its diameter is about twice, and its length about three times that of the tentacles; it is slender, round, and tapers from near the base to the acute tip. The foot is rather large, with strong auricles at the anterior corners. No operculum.

This elegantly sculptured species occurred sparingly, living, in

many of the localities off Newport, R. I., and south of Martha's Vineyard, in 1880 and 1881 (stations 869, 871, 874, 877, 880), in 65 to 252 fathoms. It was taken in larger numbers at stations 891 to 895, in 238 to 500 fathoms. In 1881, it was taken in considerable numbers at stations 917, 994, 997, 998 and 1028, in 302 to 410 fathoms; and sparingly at stations 999 and 1025, in 216 and 266 fathoms; and at 1029, in 458 fathoms. Capt. Tanner also took five specimens, Oct. 10, off Delaware Bay, at station 1049, in 435 fathoms.

Pleurotomella Pandionis Verrill.

Pleurotoma (Pleurotomella) Pandionis Verrill, Proc. U. S. Nat. Mus., iii, p. 368, 1880.

PLATE LVII, FIGURES 4, 4a.

Shell large, elongated, thick, with an acute, elevated spire; whorls nine or ten, very oblique, moderately convex, not shouldered, with a broad, flattened, or slightly concave subsutural band; whole surface covered with close lines of growth, which recede in a broad curve on the subsutural band; numerous, rather fine, unequal, raised, spiral lines, separated by well-defined grooves, of about the same breadth, and decussated by the lines of growth, cover the whole surface, except the subsutural band. The upper whorls are also crossed by sixteen to eighteen blunt, transverse, oblique ribs, about as broad as their interspaces, most elevated on the middle of the whorls, fading out above and below, and not crossing the subsutural band, which is marked only by the lines of growth; on the body-whorl the ribs become nearly or quite obsolete. Aperture elongated, oblong-ovate; outer lip, in the adult, broadly rounded and somewhat flaring, not incurved at the canal; sinus broad and shallow, but well-marked, just below the suture; canal short, nearly straight, broad and open in the mature shell; but in the immature shells the aperture is narrower, and the outer lip curves inward at the base of the canal, making it narrower. Columella having a slight sigmoid curve, its inner edge receding to the left, at the canal. Color of the most perfect specimen, waxy white, tinged with pale orange-brown, with a faint, white band on the middle of the body-whorl, and another below the suture; the other specimens are stained dark gray or brown. Operculum absent.

Length, 43^{mm}; breadth, 14.5^{mm}; length of aperture, 19^{mm}; its breadth, 5.5^{mm}. The largest example is 48^{mm} long; breadth, 17^{mm}; length of aperture, 21^{mm}; its breadth, 7^{mm}.

The uncini are relatively large and strong, being four or five times larger than in *P. Agassizii*. They form two, regular, convergent rows. The shaft is oblong-linear, flattened and twisted near the tip, and strongly barbed on both edges, the barbs unequal; base amber-colored, short, flattened transversely to the shaft, with the edge somewhat recurved, and with an oblique, short, hood-shaped appendage on one side. Length of uncini, $\cdot 0426^{\text{mm}}$; of shaft, $\cdot 033^{\text{mm}}$; breadth of shaft, $\cdot 0027^{\text{mm}}$; of base, $\cdot 0087^{\text{mm}}$.

A living specimen was taken in 1880, at station 895, in 238 fathoms. Single specimens were also dredged in 1881, off Martha's Vineyard, at stations 938 and 947, in 310 and 312 fathoms. The last was living, but not quite mature. The animal in both living specimens was so far retracted that it could be extracted only by the use of potash, so that it could not be described.

Bela (Leach); H. & A. Adams; G. O. Sars, &c.

Pleurotoma (pars) Jeffreys, and many earlier authors.

The species of this genus are numerous on our coast, but their identification has been very difficult, mainly owing to the very poor and insufficient descriptions that have been given by many writers. Möller's Greenland species, especially, are so briefly and poorly described that it is impossible to identify most of them, without reference to his original specimens.*

Fortunately, the recent admirable work of Professor G. O. Sars contains excellent illustrations of the shells and odontophores of most of the northern European species, many of which are identical with our own. His work† is indispensable for the proper study of this group. Aside from the imperfections of the published figures and descriptions, the shells are themselves variable and difficult to determine satisfactorily, especially when one has large series of specimens from numerous localities. Most of the species change greatly, both in form and sculpture, during growth, and some examples often retain juvenile characters later than others of the same species. In Binney's edition of Gould's Invertebrata of Massachusetts there are included seven northern species of *Bela*. Of these, the figures are mostly inadequate, and some are entirely erroneous. Fig. 620, given for *B.*

* Möller's collection is now in the Museum of Copenhagen. Several of his species of *Bela* were previously and better described by Couthouy, Gould, and others, in this country.

† Mollusca Regionis Arcticæ Norvegiæ, Christiania, 1878.

torricula; Fig. 621, intended for *B. harpularia*; and Fig. 624, for *B. cancellata*, do not represent those species. Fig. 620 represent *B. harpularia* better than "*B. torricula*," for which it was intended. Fig. 624, badly represents some unrecognizable species, very unlike the one intended.

Each species of the genus seems to have a longer and a shorter form, which often differ decidedly in appearance. This variation, which is also seen in many other genera of spiral shells, is probably, to a certain extent, sexual;* but it is not entirely so, for while the males seem usually to be long-spined, with narrower and flatter whorls, I have also found males among the short-spined ones. Moreover, there are, evidently, geographical races or varieties, as well as irregular individual variations, and peculiarities due to injuries of various kinds.

Unfortunately, writers have, hitherto, almost invariably neglected to state the sexes of shells figured or described; and, until recently, they have very seldom endeavored to give any idea of the character of the upper whorls, or of the young shell. In many cases it is difficult, or even impossible, to ascertain, at once, the nature of the apical whorls of species of *Bela*, owing to the fact that a very large proportion of the specimens are nearly always badly eroded. But this difficulty can usually be overcome by collecting large numbers of specimens,† including series of the young. The upper whorls and apex of these and other shells often give more reliable characters than the later whorls. The neglect to ascertain the sex cannot be avoided, so long as conchologists mostly prefer to dry all their shells.

* As the oviducts in many gastropods, which form large egg-capsules, are very voluminous and have large glands, which are situated beneath the upper part of the whorls, we should expect that this part of the mantle, and therefore of the shell, would be more expanded, to accommodate these organs. This seems to be the case, ordinarily. In examining large numbers of examples of *Natica*, *Lunatia heros*, *Nepitunea Stimpsoni*, *N. decemcostata*, *Sycotypus canaliculatus*, *S. caricus*, *Buccinum undatum*, etc., with reference to their sexual characters, I have found that the females, as a rule, are decidedly stouter, with the whorls more convex, or at least more swollen just below the suture, than the average males. But the difference is often not very marked, while each sex varies considerably in this respect, from other causes.

† Although I have made special efforts to collect and preserve as many specimens of *Bela* as possible, while engaged in dredging on our coast, nearly every season, during the past twenty years, I am free to confess that I have not yet been able to obtain a satisfactory series of all our species. For this and other reasons, this paper is not, so far as this genus is concerned, to be regarded as complete, for our species, but only as preliminary to a more complete and more fully illustrated one.

without examining the animal, but it certainly would generally have been possible for malacologists to have determined the sex of such individuals as have been dissected for the odontophore, but even this much has not often been done, in the past. I regret that, in order to use the most perfect shells, I have been obliged to figure some of the shells, on the accompanying plates, from dried specimens of unknown sex. I have, however, determined the sex, whenever possible, by dissection.

I have often observed egg-capsules attached to the shells of several of our species of *Bela*, which probably belong to these species. The capsules are translucent, solitary, circular, convex, or even hemispherical, and attached by the flat side, which is surrounded by a narrow, thin border. They are from 1 to 2^{mm} in diameter. I have never found them with the young sufficiently developed for determination.

Bela hebes Verrill.

Bela hebes Verrill, Proc. U. S. Nat. Mus., iii, p. 367, 1880.

PLATE LVII, FIGURE 7.

Shell short-fusiform or subovate, with a short, blunt spire, and with five or six convex, but slightly angled or carinated whorls, which have a slightly flattened subsutural band; suture impressed and slightly channelled. Sculpture numerous small, regular, raised, spiral ridges, separated by wider grooves; usually one, just below the subsutural band, is stronger and more raised, forming a slight carina; on the subsutural band they are faint, or indistinct. The spiral lines are often decussated, more or less, by equally slender, transverse, raised riblets, coincident with the lines of growth, but not uniformly present; these may produce a slightly cancellated structure, on all the whorls, and extend as curved riblets, across the subsutural band. The nuclear whorls are not preserved in any of my specimens. Aperture short, narrow-ovate. Outer lip expanded below the suture, then regularly rounded, thin; the posterior sinus is broad and shallow; canal very short and rather broad, straight; columella sigmoid, regularly incurved. Epidermis thin, greenish white.

Length, 8^{mm}; breadth, 5^{mm}; length of aperture, 5^{mm}; its breadth, 1.80^{mm}; length of body-whorl, front side, 6.35^{mm}. The largest specimen is 9^{mm} long; 5.5^{mm} broad.

Off Newport, R. I., 1880; stations 880, 891 and 892, in 282 to 500 fathoms; five specimens. Animal not observed.

Bela pygmæa Verrill, sp. nov.

PLATE LVII, FIGURE 8.

Shell very small, fusiform, or sub-ovate, with four or five convex whorls, a very short spire, and a large body-whorl; sculpture very finely cancellated or reticulated. The whorls are usually rather evenly rounded, moderately convex, but often have a very slightly marked, rounded shoulder; suture somewhat impressed, rather oblique. The nucleus is relatively not small, with the apex not prominent, so that it appears to be obtuse, or rounded, smooth, glassy. The whole surface below the nucleus, is covered by fine, raised, revolving cinguli, separated by slight grooves of about the same width, and by equally fine, slightly sinuous, transverse riblets, coincident with the lines of growth, and receding in a distinct curve on the sub-sutural band; the crossing of these two sets of lines produces a finely cancellated sculpture over the whole surface, but the transverse lines are usually more evident on the convexity of the whorls, while the spiral lines are more conspicuous anteriorly, and on the siphon. Aperture relatively large, oblong-elliptical, slightly obtusely angled posteriorly; sinus shallow, but distinct, evenly concave; outer lip elsewhere evenly convex. Canal short and broad, not constricted at base by any incurvature of the outer lip. Columella strongly concave or excavated, in the middle, sigmoid anteriorly. Color of shell pale greenish white, covered by a thin epidermis of similar color. Animal not observed.

One of the largest shells is 5.5^{mm} long; 2.75^{mm} broad; length of body-whorl, 4^{mm}; of aperture, 3^{mm}.

Only a few specimens have been taken off Martha's Vineyard. Stations 892 and 894, in 487 and 365 fathoms, 1880; station 947, in 312 fathoms, 1881,—U. S. Fish Com.

This little species appears to be a dwarf among the *Belas*. It bears some resemblance to *B. decussata*, but can be readily distinguished by the much finer and more uniform sculpture. It has a strong general resemblance to *B. tenuicostata* Sars, for which I at first mistook it. The latter is, perhaps, only a variety of *B. decussata*; it is a larger and stouter shell than *B. pygmæa*, with coarser sculpture.

Bela incisula Verrill, sp. nov.

? *Pleurotoma Trevelyana*, var. *Smithii* Jeffreys, Ann. and Mag. Nat. Hist., 1876, p. 332.

Bela impressa ? Verrill, Proc. U. S. Nat. Mus., iii, pp. 365, 1880, (*non* Mörch.)

PLATE XLIII, FIGURE 12. PLATE LVII, FIGURE 14.

The shell is small, sub-fusiform, to short ovate, with about five or six turreted, flattened whorls, which are angularly shouldered just below the suture. The subsutural band arises abruptly from the suture, nearly at right angles, and its surface is flat or slightly concave, marked by strongly recurved lines of growth, but mostly without spiral lines. The shoulder is often nearly right-angled. The whorls are decidedly flattened in the middle. There are on the last whorl, about twenty rather broad, flattened or rounded ribs, which are nearly straight, a little prominent and usually slightly nodose at the shoulder, but they disappear a short distance below it. They are separated by well excavated, concave grooves, deepest close to the shoulder.

The most characteristic feature of the sculpture is that the surface is marked by rather fine, but regular and distinct, sharply incised, narrow, revolving grooves, which are rather distant, with flat intervals. Of these there are usually about three to five on the penultimate whorl, and about twenty to twenty-eight on the last, the greater number being below the middle, on the siphon, where they become coarser and closer, with narrower rounded intervals. One of the sulci, just below the shoulder, is usually more distinct, and cuts the ribs so as to give their upper ends a subnodulous appearance; below this there is usually a rather wide zone, without grooves; usually no revolving lines above the shoulder. The apex is usually eroded; when perfect it is acute. The nucleus has a very small and slightly prominent smooth apex; its first turn is marked with fine spiral lines; the next whorl has, at first, about three stronger, spiral, raised cinguli, which soon begin to be crossed by thin transverse riblets.

Aperture about half the length of the shell, narrow ovate, or elliptical, angulated above. Canal short, nearly straight, a little narrowed at the base by an incurvature of the lip. The outer lip has a decided angle at the shoulder, below which the edge is well-rounded, and projects strongly forward, in the middle; the sinus, above the shoulder, is rather deep, wide, and evenly rounded within. Colu-

mella strongly excavated in the middle, obliquely receding at the end.

The shell is commonly greenish white and covered by a thin, close, greenish epidermis; but some specimens are clear white, and rarely pinkish.

Ordinary specimens are about 6.5^{mm} long; 3.5^{mm} broad; aperture, 5^{mm} long. A rather large specimen measures 7^{mm} long; 4^{mm} broad; aperture, 4^{mm} long; body-whorl, 5^{mm} long. One of the largest, having six whorls, is 8^{mm} long; 4.5^{mm} broad; body-whorl, 6^{mm} long; aperture, 4.5^{mm} long.

Uncini small, numerous (30 to 40), narrow lanceolate, not very slender, acuminate, not barbed, but with strongly involute edges; base large, the terminal lobe obtusely rounded, about as broad as long.

This is one of the most common and generally distributed species of *Bela* found on the New England coast. It inhabits both muddy and sandy bottoms, and sometimes is found among gravel and rocks. It occurs from the region off Newport, R. I., northward to Labrador, and from very shallow water, in the Bay of Fundy and Casco Bay, to 500 fathoms, off Martha's Vineyard. It is very common from Massachusetts Bay to the Bay of Fundy and Halifax, N. S., in 10 to 50 fathoms.

It was sent to me, as from Labrador, mixed with "*B. exarata*" (= *B. concinnula*), by Dr. A. S. Packard, Jr. I have dredged it in Eastport harbor and the Bay of Fundy, at many localities, in 5 to 110 fathoms, in 1864-1872. George's Bank. Casco Bay and Gulf of Maine, 1873, many localities, in 10 to 40 fathoms,—U. S. Fish Com. Salem harbor, 5 fathoms, 1873; Gulf of Maine, at seven stations, 27 to 92 fathoms, 1874; Massachusetts Bay, 20-25 fathoms, 1877 and 1878; Halifax harbor, 16-21 fathoms, and off Nova Scotia, 42 fathoms, 1877; Massachusetts Bay and Cape Cod Bay, many localities, in 13-30 fathoms, and off Cape Cod, 26-67 fathoms, 1879; off Newport, R. I., stations 814, 880, 891, in 27, 252, and 500 fathoms; off Martha's Vineyard, station 987, 28 fathoms, 1881,—U. S. Fish Com. Gulf of St. Lawrence, off Shediac, 10 fathoms,—coll. J. F. Whiteaves.

This is a small, but well-characterized species, easily distinguished from all others of our coast by its short, turreted spire; angular and flattened whorls; short, straight ribs; deep, rounded sinus; short canal; and especially by the peculiar, fine, incised revolving lines. It has, probably, hitherto been confounded, most commonly,

with *B. decussata*, which is somewhat similar in size and form, and often occurs in the same localities, but the latter has more rounded whorls and a scarcely turreted spire, the transverse ribs are decidedly sinuous, or sigmoid, and more numerous and regular, while the spiral lines are raised cinguli, crossing the ribs so as to produce a finely cancellated sculpture.

It also resembles *B. Trevelyana* of Europe, in form and size. But the latter is more regularly and more conspicuously sculptured, and the spiral lines are raised cinguli, so that it has a strongly cancellated sculpture. The Greenland shell designated as var. *Smithii*, by Jeffreys (*non Smithii* Forbes), is, perhaps, identical with our *B. incisula*. His description is very brief.

Bela tenuilirata Dall.

Dall, Am. Journ. Conch., vii, p. 98, 1871.

Bela simplex Verrill, Proc. U. S. Nat. Mus., iii, p. 367, 1880, (*non* Middendorff).

A single immature specimen, referred to this species by Mr. Dall, was taken in 1880. Whorls six, including the nucleus, very convex and evenly rounded, nearly smooth, but covered with fine and close impressed spiral lines, which appear wavy, or subpunctate, and are separated by intervals of about equal width; these are crossed by still finer, distinct lines of growth; subsutural zone smoother, with fine curved lines of growth. The apex of the spire is acute; suture impressed. The nucleus, consisting of nearly three apical whorls, is chestnut-brown; their surface is finely decussated by equal lines running obliquely in opposite directions.

Aperture large, ovate; canal somewhat prolonged, straight, narrowed toward the end; sinus, apparently wide and shallow; columella, nearly straight.

The shell is pale flesh-color, covered with a thin, smooth, glossy, pale yellowish brown epidermis. Length, 9^{mm}; breadth, 5^{mm}; length of body-whorl, 7^{mm}; of aperture, 6^{mm}.

One dead, but fresh, specimen, from station 894, in 365 fathoms, off Martha's Vineyard. Alaska,—Dall.

This species is probably not a true *Bela*. The nucleus is not like that of a *Bela*. It more nearly resembles *Pleurotomella*, in several respects.

Bela Pingelii (Möller) H. & A. Adams.

Defrancia Pingelii Möller. Ind. Moll. Grönl. Krøyer's Tidss., iv, p. 86, 1842.

Bela Pingelii H. & A. Adams, Genera, i, p. 92, 1858.

G. O. Sars, Mollusca Reg. Arcticæ Norvegiæ, p. 223, pl. 16, fig. 5, 1878.

Verrill, Proc. U. S. Nat. Mus., iii, p. 364, 1880.

PLATE XLIII. FIGURE 16.

Shell slender, elongated, with a long, tapering, acute spire; whorls, seven or eight, the lower ones broadly and nearly evenly rounded, the upper ones more or less carinated in the middle; suture strongly impressed, unusually oblique. The lower whorls are crossed by numerous (about twenty-four) close, narrow, not very prominent, flexuous ribs, which are decidedly excurved on the subsutural band; on the body-whorl they fade out just below the middle. Strong, elevated, nodulous spiral lines, or cinguli, separated by narrower, deep grooves, cover the surface of all the whorls below the nucleus, crossing both the ribs and grooves; on the middle of two or three, or more, of the upper whorls, one of these spiral lines is stronger than the rest, forming a distinct carina; on the lower whorls the spiral lines are narrower in the grooves than where they cross the ribs, on which they are thickened, so as to form strong, elliptical nodules, with smoothish rounded tops; on the subsutural band the ribs and spiral lines are narrower and the nodules less distinct; on the anterior part of the body-whorl the spiral cinguli become more crowded, with narrower grooves, and are not nodulous, though roughened by the lines of growth; on the siphon they become much finer and closer. The nucleus is very prominent, the whorls separated by deep, very oblique sutures: the apical whorl is, at first, small and smooth, but two raised spiral lines commence on the first whorl; on the second there are three to four, the two middle ones forming stronger carinæ; on the third there are four to five, one of the middle ones becoming a more prominent carina, and on this whorl they are crossed by transverse ribs, rendering them nodulous.

The aperture is rather small, oblong-ovate; the posterior sinus is broad and shallow, but distinct; below this the outer lip is evenly and broadly rounded; canal very short, straight, rather wide, but a little constricted by the incurvature of the lip, at its base; columella only a little curved, slightly sigmoid. Animal not observed.

Color of the shell, pale chestnut-brown, with the canal and columella, whitish.

Length of an average specimen, having seven whorls, 11.5^{mm} ; breadth, 4.25^{mm} ; length of body-whorl, in front, 7^{mm} ; its breadth, 4^{mm} ; length of aperture, 4.75^{mm} ; its breadth 2.25^{mm} .

This very distinct species was dredged by me several times, in small numbers, at Eastport, Me., in 1864, 1868, 1870, in 20 to 90 fathoms. One specimen was dredged by Messrs. S. I. Smith and O. Harger, of the the United States Fish Commission, in 1872, on Le Have Bank, off Nova Scotia, in 45 fathoms. Off Cape Cod, 34 fathoms, 1879. It appears to be a very rare species, however, and none of my specimens have the animals preserved. Greenland,—Möller; Northern Norway,—G. O. Sars.

This has not unfrequently been confounded by authors with *B. cancellata*, and perhaps with *B. pyramidalis*. It is our most slender and elongated species, with broadly rounded whorls, strongly cancellated by numerous narrow transverse ribs and raised revolving lines, or cinguli, which are about equally prominent, and form small, oblong nodules where they cross the ribs.

Bela Gouldii Verrill (sp. or var. nov.)

?*Bela rugulata* (Möller, MSS.) G. O. Sars, op. cit., p. 230, pl. 23, fig. 6; pl. viii, figs. 13 a-c (dentition), 1878 (*non* Reeve.)

Bela rugulata Verrill, Proc. U. S. Nat. Mus., iii, p. 366, 1880.

?*Bela assimilis* G. O. Sars., op. cit., p. 231, pl. 23, fig. 8. pl. viii, fig. 17. 1878.

PLATE LVII, FIGURES 6, 6a.

Shell fusiform, with a rather high, regularly turreted, acute spire. Whorls six or seven, strongly flattened, abruptly and squarely carinate-shouldered; broadest at the shoulder; the carina rises into prominent, but small nodules where it crosses the ribs. Sculpture coarse and prominent. Above the carina, or shoulder, the surface descends with an abrupt slope to the suture, forming a rather broad subsutural band, which is crossed by the somewhat prominent, excurved continuations of the ribs; between these are smooth, concave interspaces; spiral lines do not occur, unless very rarely and sparingly, on the subsutural band. The suture is rather oblique. The ribs are about 15 on the last whorl, prominent, but narrow, rather acute, with a smoothish edge; they are nearly straight below the carina, and gradually fade out toward the base of the canal; the intervals between the ribs are broad, concave, much wider than the ribs, crossed by well-marked, raised, spiral lines, which are much less elevated than the ribs, and not crowded, often unequal, rather stronger and more distant at the base of the

canal; on the penultimate whorl there are usually four, rarely five, spiral lines visible, below the carina. The nuclear whorls are small and prominent; the apex is small and soon two strong spiral lines appear; the uppermost of these becomes a carina, on the whorl next to the nucleus, while above and below it thin transverse riblets appear; the normal sculpture then commences. But the upper whorls are usually badly eroded. The aperture is oblong-ovate, angulated posteriorly at the shoulder, narrowed at the base of the canal, which is somewhat elongated and contracted; sinus shallow, broadly concave; outer lip thin, strongly flattened, below the shoulder in the middle, and incurved at the base of the canal. Columella nearly straight in the middle, a little excurved or sigmoid, anteriorly.

Color white, or greenish white, epidermis pale green, thin, glossy.

The uncini are remarkably broad and short, lanceolate, acute, with the edges involute, not distinctly barbed; basal process short, broad.

An ordinary example measures in length, 14^{mm}; breadth, 6.5; length of body-whorl in front, 9.25; its diameter, 5.5; length of aperture, 7; its breadth, 2.5^{mm}. Specimens ascertained to be males, by dissection, agree in proportions with these measurements.

This species is one of the most common in Massachusetts Bay, Cape Cod Bay, and the Gulf of Maine, in 15 to 115 fathoms. Off Cape Cod (sta. 304), 122 fathoms. It is most frequent in 25 to 60 fathoms, and occurs both on muddy and on gravelly and shelly bottoms. It was also taken by the U. S. Fish Commission in Casco Bay, in 17 to 30 fathoms, in 1873; Halifax harbor and Bedford Basin, in 16 to 41 fathoms, 1877. I have seen no specimens from farther north.

This shell has, undoubtedly, been generally confounded, under the name of "*B. turricula*," with several other related species. It closely resembles some forms of *B. scalaris* and of *B. exarata*, but differs greatly from both in its dentition. From both, the shell can usually be distinguished by the absence of spiral lines on the subsutural band, and by having fewer and more distant spiral lines on the middle of the whorls. *B. exarata* has decidedly more numerous and smaller ribs with smaller nodules, and also a shorter canal and differently shaped aperture. *B. scalaris* has nearly the same form of aperture and canal; but it is a stouter shell, with the whorls less flattened, and the aperture is broader.

With eroded specimens, such as often occur, it will not always be possible to distinguish these three species with certainty, without examining the odontophore. It is not possible, at present, for me to identify this shell positively with any of those described by G. O.

Sars and other European writers. It most resembles, so far as the shell is concerned, Sars' *B. assimilis*, but the uncini in the latter are more slender and more acute. In the uncini our shell agrees closely with Sars' *B. rugulata*, but the shell that he figures under that name is decidedly shorter, with a more obtuse spire and finer sculpture, and appears, by the figure, to have spiral lines on the subsutural band.* The *B. scalaroides* Sars also has similar uncini, but in form and sculpture the shell does not agree so well. I have, therefore, preferred to give this common and well-marked species a distinctive name. Even if it should, hereafter, prove to be conspecific with *B. rugulata*, or *B. assimilis* (if these be really distinct species), it will still be desirable to designate it as a marked variety, for which, var. *Gouldii* would be an appropriate name.

Bela exarata (Möller) H. & A. Adams.

Defrancia exarata Möller, Ind. Moll. Grönl., Krøyer's Tidss., iv, p. 85, 1842.

Bela exarata H. & A. Adams, Genera, i. p. 92, 1858.

? G. O. Sars, op. cit., p. 232, pl. 16, fig. 18; pl. ix, figs. 1 *a*, *b* (dentition, etc.)

Verrill, Proc. U. S. Nat. Mus., iii, p. 366, 1880. (in part.)

Several specimens taken in 5 to 8 fathoms, at Grand Menan Island, in 1872, agree accurately with Greenland specimens, sent under the name of *B. exarata* from the museum of Copenhagen.

These also agree with Möller's original description, so far as that goes, especially in having a short spire. The figure given by G. O. Sars represents a longer-spined shell, with more numerous revolving lines and ribs, and a wider canal.

Our shell is short-fusiform, with the spire short, turreted, acute, about as long as the aperture. Whorls six, swollen, nearly squarely carinate-shouldered, flattened below the shoulder, but constricted at the suture, which is well-impressed and only a little oblique. Ribs 14 or 15, thick and prominent, nearly straight, obtusely rounded, about as wide as their interspaces, which are deeply concavely excavated, especially near the shoulder; at the shoulder the ribs rise into small, compressed nodules, which are connected by the thin revolving carina: in crossing the abrupt subsutural band, the ribs are prominent and only slightly bent. The raised revolving cinguli are coarse, distinctly thickened in crossing the ribs, producing small nodules, so that the surface appears somewhat rough; the cinguli are

* It seems to me doubtful whether the "*Bela rugulata*" of other writers is the same as Sars' species.

usually rather coarser and more distant at the base of the canal, after the ribs disappear; between the carina and the base of the canal there are about 9 or 10 cinguli; the first is a little more distant from the carina; on the penultimate whorl there are usually but two, or rarely three, cinguli visible, and often but one; several fine cinguli cross the subsutural band. By the ribs and cinguli a deeply cancellated structure is produced, but the ribs are much stronger than the cinguli. The nucleus is very small and the normal sculpture commences very early.

The aperture is rather small, but is more than half the length of the shell; outer lip angulated at the shoulder and flattened below it, then broadly rounded, incurved at the base of the short canal, which is much narrowed, straight, or slightly excurved.

Color, yellowish white.

Length, 7.5^{mm}; breadth, 4^{mm}; length of body-whorl, 5.3^{mm}; breadth, 3.5^{mm}; length of aperture, 4^{mm}; its breadth, 1.5^{mm}.

Seal Cove, Grand Menan, 5 to 8 fathoms (8 specimens).—H. E. Webster, 1872. Halifax harbor, stations 72, 73, in 18 fathoms, 1877. —U. S. Fish Com. Massachusetts Bay, 16 fathoms, 1879. Greenland. Perhaps, northern Europe.

Bela concinnula Verrill, sp. nov.

Bela exarata (pars) Verrill, Proc. Nat. Mus., iii. p. 366, 1880.

PLATE XLIII, FIGURE 15. PLATE LVII, FIGURE 11.

Shell rather small and delicate, long-ovate, regularly turreted, with about six whorls, which rise almost at right angles from the suture, and have an angular, or squarish, nodulous shoulder, usually distinctly carinated by a thin, raised, spiral keel, which forms small, but prominent nodules where it crosses the ribs; below the shoulder the whorls are abruptly flattened. The subsutural band is usually little convex, or nearly flat.

The ribs are numerous (often 20 to 25) regular, nearly straight below the shoulder, but rounded, separated by concave intervals of equal or greater width; they extend entirely across the upper whorls, but fade out below the middle of the body-whorl; above the shoulder they are slightly excurved, and smaller across the subsutural band. Whole surface covered with regular and rather strong, rounded, elevated, revolving cinguli, which cross the ribs and produce on them small, rounded nodes, and give a pretty regularly and rather finely but strongly cancellated appearance to the whole surface. On the penultimate whorl there are four or five cinguli below the angle. The

abruptly flattened subsutural band, above the shoulder, is covered with numerous much finer and closer revolving lines; on the anterior part of the body-whorl the cinguli are rather stronger than on the middle, and separated by wider grooves, but they are only slightly roughened by the lines of growth; on the canal they become finer and closer; between the carina and the base of the canal there are 12 to 14 cinguli. The nucleus is small and regular; at first smooth, then two raised spiral lines begin on the first whorl, and soon become distinct carinae, on the second to third whorl, the upper one forming the shoulder; slender transverse riblets begin on the second, and become very evident on the third whorl.

Aperture narrow-ovate, angulated posteriorly; sinus broad and shallow; outer lip, in front of the sinus, distinctly flattened, then broadly rounded, very slightly incurved at the base of the canal, which is narrow, a little produced, and slightly curved; columella decidedly sigmoid, its inner edge excurved at the end.

Color of the shell white, or pale greenish white, covered with a thin, pale green epidermis.

The tentacles are short and obtuse in alcoholic specimens, with conspicuous black eyes; penis relatively large, bent back in a sigmoid form, flattened, broadest in the middle, tapering.

Uncini, linear, very acute, relatively large, long, slender, curved, with a short ovate basal appendage; length of uncini, $.052^{\text{mm}}$; breadth, $.0032^{\text{mm}}$.

A rather large male is 11.5^{mm} long; breadth, 5.25^{mm} ; length of body-whorl, 7^{mm} ; its breadth, 5^{mm} ; length of aperture, 5^{mm} ; its breadth, 2^{mm} . An ordinary specimen, measures, in length, 10^{mm} ; breadth, 4.5^{mm} ; length of aperture, 5.5^{mm} .

This species is common and widely distributed on this coast. It ranges from the region south of Martha's Vineyard, in deep water, to Labrador. By the U. S. Fish Com. it was dredged, off Newport, R. I., and Martha's Vineyard, in 252 to 487 fathoms (stations 880, 892, 947, 994, 1038), 1880 and 1881; Cape Cod Bay and off Cape Cod, 25 to 122 fathoms, 1879; Massachusetts Bay, 20 to 29 fathoms, 1877; Gulf of Maine, many stations, 25 to 88 fathoms, 1873, 1874, 1878; 150 fathoms, 1872; Casco Bay, 1873; George's Bank, 50 to 65 fathoms, 1872; south of George's Bank, 430 fathoms, 1872; Halifax harbor, 16 to 21 fathoms, and off Halifax, 42 fathoms, 1877.

The specimens from Labrador were sent as *B. exarata*, by Dr. A. S. Packard, Jr.

This shell is closely allied to *Bela exarata*, and may ultimately

prove to be only a variety of the latter, as I formerly supposed, but it differs much in appearance from the form that I have described, above, as the true *B. exarata*. The spire is much longer; the whorls are flatter and more regularly turreted, with more regular nodules on the shoulder; the ribs are smaller, more regular, and more numerous; the spiral cinguli are more numerous, and so nearly equal to the ribs as to produce a very regular cancellation; the aperture is larger and longer, with a narrower and decidedly longer canal.

The shell figured by G. O. Sars as *B. exarata* strongly resembles this species in general form and sculpture, and in the uncini, but it has a shorter aperture and a wide, open canal, very unlike that of our shell. Whether Sars' shell is identical with the true *B. exarata* is doubtful, for that was described as having a short spire, while his shell has a long spire.

Bela concinnula, var. *acuta* Verrill, nov.

Bela mitrula? Verrill, Proc. Nat. Mus., iii, p. 366, 1880.

PLATE LVII, FIGURE 10.

Shell more slender than the preceding, with a longer and more acute spire, and narrower aperture. Whorls more flattened, with the nodules on the shoulder more prominent and sharper, and the carina higher. In other respects it is similar.

In some examples the ribs are fewer than usual. Sometimes the outer lip has a decided incurvature, just below the angle made by the shoulder.

The uncini (Plate LVII, fig. 10) agree closely with those of *B. concinnula*, except that they were smaller in the specimen examined,—perhaps due to its being younger.

Length of one of the largest examples, 10^{mm}; breadth, 4.2^{mm}; length of body-whorl, 6^{mm}; its breadth, 3.75^{mm}; length of aperture, 5^{mm}; its breadth, 1.6^{mm}.

Casco Bay, 1873; Gulf of Maine, 88 to 118 fathoms, 1873, 1874, 1877; Massachusetts Bay and Cape Cod Bay, 16 to 20 fathoms.—U. S. Fish Com.

Specimens intermediate between this variety and *B. concinnula* have been found, so that it is, doubtless, only a slender form of that species.

This variety bears considerable resemblance to *Bela mitrula* Lovén, as figured by G. O. Sars, and its uncini also agree well with those of the latter, so that I formerly thought it might be identical. But

B. mitrula, as figured, has a different aperture, a wider and more open canal, and its spire is more elevated, with the whorls more broadly exposed.

Owing to the great amount of confusion that exists, both in this country and Europe, in regard to our commoner species of *Bela*, I have given several new figures, and now add the following entirely new descriptions of those species contained in Binney's Gould and other works on New England Conchology, hoping that, in the future these details may aid others in the more accurate identification of our species of this difficult genus.

At present it seems useless to attempt to identify many of our species of *Bela* with those of other regions without a direct and extensive comparison of the specimens themselves, including not only their shells, but also their odontophores. Moreover, the confusion, as to names, is so great that no reliable data can be given as to the foreign distribution of these species. The same remark also applies to the recorded localities of such species, in the fossil state, whether in America or Europe.

Bela scalaris (Möll.) H. and A. Adams.

Defrancia scalaris Möller, Ind. Moll. Grönl., Krøyer's Tidss., iv, p. 85, 1842.

Fusus turricula Gould, Rep. on Invert. of Mass., 1st ed., p. 292, pl. 13, fig. 193, 1841, (non Montagu, sp.)

Mangelia turricula (pars) Stimpson, Shells New Eng., p. 48, 1851.

Bela turricula Gould, Rep. on Invert. of Mass., Binney's ed., p. 351, fig. 620, 1870.

Bela scalaris G. O. Sars, Moll. Arctice Norvegiæ, p. 229, pl. 23, fig. 5, pl. viii, fig. 16, (dentition).

Bela americana Packard, Mem. Boston Soc. Nat. Hist., vol. i, p. 285, pl. 7, fig. 11, 1866.

PLATE LVII, FIGURES 12, 12a.

Shell large, fusiform, regularly turreted, with a rather high, acute spire. Whorls seven or eight, strongly ribbed, angularly and nearly squarely shouldered; the shoulder is distinctly, but usually not strongly carinated, not at all nodulous, or but slightly so; the whorls are much flattened below the shoulder, but are still a little convex, narrowing somewhat at the suture; the subsutural band is broad, rising abruptly from the suture, and sloping slightly to the shoulder, which it joins at a slightly obtuse angle. The whorls are crossed by 14 to 20 strong, rounded, rather regular, nearly straight, prominent ribs; they are a little thickened and at the shoulder separated by broader, concave interspaces; the ribs are continued across

the subsutural band, nearly as strongly as in front of the shoulder, but in crossing it they are strongly excurved, with concave interspaces, circumscribed externally by the carination at the shoulder. The ribs extend nearly to the base of the canal. Numerous strong, close, well-defined, raised spiral cinguli, separated by grooves sometimes nearly or equally as broad, but usually narrower, crossing the ribs and their interspaces, cover the whole surface of the whorls, including the subsutural band, on which there are six or seven very distinct cinguli, somewhat finer than those below the shoulder; anteriorly, toward the base of the canal, the grooves are wider and the cinguli are usually coarser. The apex of the spire is acute, with a small, prominent nucleus; the nuclear whorls, except at the very first, have two strong, spiral carinae, and then three, while on the next whorl riblets appear, and the whorl becomes carinate-shouldered.

Aperture rather large, oblong, or oblong-elliptical, angulated at the shoulder. Outer lip with a broad and very shallow sinus, broadly rounded below the shoulder, and distinctly incurved at the base of the canal. The canal is narrow and somewhat elongated, and a little excurved. Columella sigmoid, considerably curved.

Color of shell white, pale greenish white, or yellowish white.

A medium-sized specimen, with seven whorls, is 18^{mm} long; breadth, 8^{mm}; length of body-whorl, in front, 13^{mm}; its breadth, 7.5^{mm}; length of aperture and canal, 9.5^{mm}; its breadth, 3.5^{mm}. A specimen, ascertained to be a male, by dissection, measures, in length, 20^{mm}; breadth, 9.5^{mm}, length of aperture 11^{mm}. Another male is 18.5^{mm} long, 8.5^{mm} broad; length of body-whorl, 12.5^{mm}; its breadth, 7.5^{mm}; length of aperture, 10^{mm}; its breadth, 3.5^{mm}. The largest specimen, from Eastport, Me., with the canal broken, must have been over 25^{mm} long; breadth, 11^{mm}; length of spire, from posterior end of aperture, 14^{mm}; this had over 8 whorls.

This is our largest species of *Bela*. Its range is from off Cape Cod to Labrador, Greenland and northern Europe. It is probably circumpolar. It is not uncommon at Eastport, Me., and in the Bay of Fundy, where I dredged it in 1864, 1865, 1868, 1870, 1872, at various localities, in 10 to 90 fathoms. By the U. S. Fish Com. parties it was dredged in Broad Sound, Casco Bay, and off Half-way Rock, in 14 to 29 fathoms, 1873; Gulf of Maine, 60 fathoms, near the Isles of Shoals, 25 fathoms, at Jeffrey's Ledge, 51 fathoms, 1873 and 1874; Massachusetts Bay, 29 to 40 fathoms, 1877, 1878, 1879; off Cape Cod, at nine stations, 15 to 32 fathoms, 1879; Halifax harbor, 25 fathoms, and off Halifax, 59 to 190 fathoms, 1877. Labrador specimens were

sent to me by Dr. A. S. Packard, Jr., as *B. turricula* and *B. americana*.

This species is one of the several shells that have usually been confounded under the name of *B. turricula*. The latter is European, and apparently does not occur on our coast.

Bela harpularia (Couth.) H. and A. Ad.

Fusus harpularius Couthouy, Boston Journal Natural History, vol. ii. p. 106, pl. 1, fig. 10, 1838.

Gould, Invertebrata of Mass., ed. i. p. 291, fig. 191. 1841.

Mangelia harpularia Stimpson, Shells of New England, p. 48. 1851.

Bela harpularia H. and A. Adams, Genera of Recent Mollusca, vol. i. p. 92, 1858.

Gould, Invertebrata of Mass., ed. ii, p. 352, fig. 191, (*non* G. O. Sars).

Verrill, Report Invert. Anim. of Vineyard Id., in 1st Rep. U. S. Fish Com., pp. 636, 508, pl. 21, fig. 108 (after Gould), 1874, (auth. cop., p. 342).

PLATE XLIII, FIGURE 14. PLATE LVII, FIGURE 9.

Shell solid, regularly fusiform, with a moderately high, acute spire. Whorls seven, with a sloping subsutural band, and the shoulder obtuse and scarcely carinated: the shoulder is farther in front of the suture than in the three preceding species, less raised, and not so abrupt: the whorls are flattened, but yet slightly convex in the middle. About 18 to 20 rather close, broadly rounded ribs cross the lower whorls: the ribs are separated by concave interspaces of about the same breadth, and are only slightly bent: at the shoulder they are more prominent and a little thickened: on the upper whorls often slightly nodulous: on the subsutural band they become fainter and are a little excurved: they fade out below the middle of the body-whorls. Fine, close, wavy, raised spiral lines, or cinguli, cover the entire surface, crossing equally the ribs and the interspaces: they are coarsest and most distinct on the middle of the whorls, becoming much finer and more wavy anteriorly, toward the base of the canal, and posteriorly toward the shoulder: on the subsutural band they are very fine and regular. The apex is acute and compact: the first nuclear whorl is very small, not prominent, smoothish: the second has at first two and then three thin carinae: riblets begin on the next.

Aperture narrow-elliptical, scarcely angulated. Outer lip broadly rounded, with a broad and very shallow, posterior sinus, and incurved at the base of the canal, which is short, straight, and narrow. Columella sigmoid.

Color, usually pale reddish brown, or rosy, with the anterior part of the body-whorl and canal whitish: often entirely white or yellowish white; sometimes yellowish brown.

A large example (sex unknown), measures, in length, 17^{mm}; breadth, 7.5^{mm}; length of body-whorl, 11.5^{mm}; its breadth, 6.4^{mm}; length of aperture, 9^{mm}; its breadth, 3^{mm}. A specimen ascertained to be a male is 14.5^{mm} long; breadth, 6.5^{mm}; length of body-whorl and canal, 9.75^{mm}; breadth of body-whorl, 6^{mm}; length of aperture, 8^{mm}; its breadth, 2.5^{mm}.

This species ranges from Long Island Sound to Nova Scotia, but is less common northward. It is the most common species south of Cape Cod, in moderate depths (18 to 30 fathoms), where it is usually unaccompanied by any other species, and occurs of large size and typical form. We took it off Gay Head, Martha's Vineyard, 18 to 29 fathoms, in 1871, 1880, 1881; off Block Island, 20 to 28 fathoms, 1874, 1880; eastern end of Long Island Sound, 1874; Massachusetts Bay, 8 to 29 fathoms, 1873, 1877, 1878, 1879; Cape Cod Bay, and off Cape Cod, 15 to 34 fathoms, 1879; Casco Bay, 1873; Eastport, Me., and Bay of Fundy, 10 to 50 fathoms, 1870, 1872; Halifax harbor, 20 fathoms, and off Halifax, 120 miles, 190 fathoms, 1877; off Martha's Vineyard, 104 miles, 368 fathoms, 1881. Messrs. Smith and Harger, on the "Bache," in 1872, took it at various localities on George's and Le Have Banks, in 25 to 60 fathoms.

Bela harpularia has often been confounded with *B. scalaris*, *B. cancellata*, and other species. It differs widely from the former in the shape of the aperture and in the brevity of the canal; in the more sloping and obtuse shoulder; in the closer ribs; and in the finer and peculiarly waved spiral lines, which are finer near the shoulder. *B. cancellata* has a higher and more acute spire, flexuous ribs, and coarser spiral sculpture, which becomes still coarser anteriorly, toward the canal.

De-francia Woodiana Möller, from Greenland, has been considered identical with this species by several authors. Möller's description is of no value. I have seen no Greenland examples of *B. harpularia*, and as it becomes decidedly rarer to the northward, on our coast, its occurrence at Greenland seems to me doubtful. It becomes comparatively rare in the Bay of Fundy and off Nova Scotia, where it is mostly replaced by *B. cancellata*, *B. scalaris* and other more arctic forms. A somewhat similar shell, which I have identified as *B.*

Woodiana, occurs on the coast of Greenland, from whence I have specimens, and on the coast of Nova Scotia; this is probably the Greenland shell that has been mistaken for *B. harpularia* by various writers.

The shells described and figured by Professor G. O. Sars as *B. harpularia* and its variety, *rosca*, do not appear to me to be identical with the true *B. harpularia*. His shell has a different aperture, the whorls are more decidedly and squarely shouldered and the ribs fewer and more distant. It is possibly the shell mentioned above as probably *B. Woodiana*.

Bela cancellata (Mighels) Stimpson, Check List, 1860.

Fusus cancellatus Mighels, Proc. Boston Soc. Nat. Hist., i, p. 50, 1841: Boston Journ. Nat. Hist., iv, p. 52, pl. 4, fig. 18, Jan., 1842.

Bela cancellata Gould, Invert. Mass., ed. ii, p. 355, description (but not the figure, 924), (non G. O. Sars).

Verrill, Proc. U. S. Nat. Mus., iii, p. 364, 1880.

PLATE XLIII, FIGURES 10, 11. PLATE LVII, FIGURE 13.

Shell elongated, with a long, tapering, acute, somewhat turreted spire. Whorls nine, somewhat convex, shouldered obtusely at some distance below the suture; the subsutural band is rather wide, and a little convex, sloping gradually to the obtuse shoulder, which is angular and more or less carinated on the upper whorls, but usually rounded and not at all carinated on the lower ones. Suture well-impressed, more oblique than in most species. The ribs on the body-whorl vary from 18 to 21; they are stout, prominent, broadly rounded, separated by concave grooves of about the same breadth, strongly flexuous, with a sigmoid curvature at the shoulder, less prominent and decidedly excurved in crossing the subsutural band; anteriorly they fade out before reaching the base of the canal. Coarse spiral cinguli cover the whole surface, except the subsutural band, on which they are usually few and faint, or absent; the cinguli are broad and separated by narrower furrows, or incised grooves, which are made wavy by the distinct lines of growth; on the body-whorl there are about 12 to 14 of the spiral grooves, between the shoulder and the base of the canal; the cinguli become coarser, with deeper, wider and more distant grooves anteriorly, toward the base of the canal, but on the latter they become finer and closer; on the penultimate and next preceding whorls there are about 5 or 6 spiral grooves visible. The spiral grooves are usually fainter in crossing the ribs, and in specimens somewhat worn they often do not show at all on the ribs; but on very fresh specimens they are usually perfectly distinct on the ribs.

The apical whorls are very prominent with deep, oblique sutures, the first nuclear whorl is angulated, apparently, from its origin, by two spiral lines, which quickly become raised, spiral carinae; on the

second whorl a third, anterior carina appears, and these, before the third turn, begin to be crossed by thin, raised riblets; the succeeding upper whorls are more or less carinated at the prominent, angular, but obtuse shoulder, and have 12 to 14 prominent ribs.

Aperture, in the adult shell, relatively short and small, oblong-elliptical, outer lip broadly rounded, with a broad and shallow, but distinct, posterior sinus. Canal very short, straight, rather wide and open, usually not at all constricted at its base. Columella sigmoid. In immature shells the aperture is relatively longer and larger, and the canal is longer and narrower.

Color of the shell often white; sometimes pale rosy, or light chestnut-brown, with the canal and anterior part of the body-whorl white, as in *B. harpularia*.

Length of a large example, of the elongated form, 20^{mm}; breadth, 7.75^{mm}; length of body-whorl, in front, 12^{mm}; its breadth, 6^{mm}; length of aperture, 9^{mm}; its breadth, 3^{mm}. Another elongated specimen is 17^{mm} long; breadth, 6.5^{mm}; length of aperture, 7.5^{mm}; its breadth, 2.5^{mm}. One of the shorter form is 15.5^{mm} long; breadth, 7^{mm}; length of aperture, 8^{mm}; its breadth, 3^{mm}. The specimen of which the uncini are figured was a female, from Eastport, Me., and measured 14^{mm} in length; breadth, 6^{mm}; length of body-whorl, with canal, 9.5^{mm}; its breadth, 5^{mm}; length of aperture, 7^{mm}.

The uncini (Plate LVII, fig. 13), are relatively large, long, slender (but less so than in *B. exarata*), very acute, not distinctly barbed; basal process longer than broad, narrowed and bluntly rounded posteriorly. Length of uncini, .0507^{mm}; breadth of shaft, .0066^{mm}; length of base, .0107^{mm}; its breadth, .0086^{mm}.

This shell extends from Martha's Vineyard, in 126 and 312 fathoms (stations 877, 947), north to Nova Scotia and Labrador; and probably to Greenland and Northern Europe. It is one of the most common species in the cold waters of the Bay of Fundy, near Eastport, Me., and Grand Menan I., in 10 to 100 fathoms, where I have often dredged it, in 1861, 1863, 1864, 1865, 1868, 1870, 1872. We have also taken it, on the various U. S. Fish Com. expeditions, off Nova Scotia; in the Gulf of Maine; Casco Bay; Massachusetts Bay; off Cape Cod, etc., in 12 to 92 fathoms. George's Bank, 50 fathoms, by Smith and Harger, on the "Bache," in 1872. Square Island, Labrador, 30 fathoms, sent by Dr. A. S. Packard, Jr., as *B. VahlII*, *B. cancellata*, and *B. pyramidalis*.

This species is liable to be confounded, especially when eroded, with *B. harpularia*, *B. pleurotomaria* and *B. Gouldii*. From the

first it differs in being more elongated, but its coarser spiral sculpture, not becoming finer anteriorly, nor toward the shoulder, but disappearing on the subsutural band, gives a better diagnostic character; its ribs are also more sigmoid. From *B. Gouldii* it differs in having the whorls much more sloping, and not squarely carinate-shouldered, nor nodulous; in not having straight ribs; in the spiral sculpture, and in having a shorter aperture and canal. In *B. pleurotomaria* the spiral sculpture is much less developed, and the spire is usually more slender.

The positive identification of this shell with similar species described from Greenland and Northern Europe is not possible, at present. I have, myself, seen no specimens from those regions that could be called identical. Authors, both in this country and in Europe, have often mistaken other shells for this species, or have confounded several with it.* I have seen *B. decussata*, *B. pleurotomaria*, *B. exarata*, *B. Pingelii*, and other species labeled as "*B. cancellata*" in American collections. There is reason to believe that the confusion is even greater in foreign collections.

Mörch erroneously identified this species with *B. Pingelii* and *D. cinerea* Möller. Jeffreys, also, has identified this species with *B. Pingelii*.

Among the forms figured by Professor G. O. Sars, *B. elegans* Möller resembles closely some of the varieties of this species, and may be identical. Möller's description of *B. elegans* is very brief and indefinite, but, so far as it goes, applies well enough to this shell. Jeffreys records a "*Pleurotoma elegans*" from the Gulf of St. Lawrence, which is possibly this species. *B. angulosa* Sars also resembles the smaller and more slender varieties.

The shell named *B. cancellata* by Sars is a distinct species, to which I have elsewhere given the name, *B. Sarsii*. (See p. 484.)

It has a much coarser cancellation, produced by the more distant spiral lines, crossing very broad and nearly straight ribs. The shell itself is more narrow, and has flatter whorls. The uncini also differ.

* The cut in Binney's Gould (fig. 924), was probably made from some other species, but the figure is too bad for identification. The original figure by Dr. Mighels is very much better.

Bela pleurotomaria (Couthouy) Adams.

Fusus pleurotomarius Couthouy, Boston Journal of Natural History, vol. ii., p. 107 pl. 1, fig. 9, 1838.

Fusus rufus Gould, Invert. of Mass., ed. i, p. 290, fig. 192 (*non* Montagu).

? *Buccinum pyramidale* Ström. N. A. Dan., iii, p. 296, fig. 22 (*et non* *Bela pyramidalis* G. O. Sars).

Defrancia Vahlü (Beck) Möller, 1842 (t. Lovén).

Mangelia pyramidalis Stimpson, Shells of New England, p. 49, 1851.

Bela pleurotomaria H. and A. Adams, Genera Recent Mollusca, i, p. 92, 1858.

Gould, Invert. of Mass., ed. ii, p. 355, fig. 625.

Verrill, Report Invert. Anim. of Vineyard Id., in 1st Rep. U. S. Fish Com., p. 637, 1874. (auth. cop., p. 343).

Shell long-fusiform, with a high, tapering, acute spire. Whorls seven or more, well-rounded, not distinctly shouldered nor carinated, constricted above the sutures, which are well-impressed and not very oblique; no distinct subsutural band. Ribs about 13 to 16 on the last whorl, rather prominent, rounded, sigmoid, strongly excurved on the upper part of the whorl, incurved and less prominent close to the suture; they fade out below the middle of the whorl; on the preceding whorls they are prominent at and above the middle, and decidedly sigmoid; the intervals between them are deeply concave and rather wider than the ribs. The spiral cinguli are numerous, fine, wavy, unequal, and inconspicuous, becoming more distinct, and rather coarser toward the anterior part of the body-whorl, and on the uppermost whorls; they are often absent across the ribs, and frequently are scarcely apparent, even with a lens, on the more convex part of the lower whorls, where they are always fine; they are also fine on the subsutural portion.

The nucleus is small, but prominent, with the whorls separated by deep sutures; the first half-whorl is smooth; then three raised spiral cinguli appear, which become strong carine on the second whorl; on the third and fourth whorls these are crossed by raised riblets, producing a cancellated sculpture.

The aperture is short and small, narrow-ovate; the outer lip has a very distinct, wide, shallow sinus; below this it is evenly rounded, a very little incurved at the base of the canal, which is short, straight, and narrow.

Color, when fresh, pale chestnut-brown to reddish brown, usually paler anteriorly.

A specimen of the stouter variety, having seven whorls, is 13.25^{mm} long; breadth, 6^{mm}; length of body-whorl, 9^{mm}; breadth, 5.15^{mm};

length of aperture, 6.5^{mm} ; its breadth, 2.3^{mm} . One, of the more slender variety, is 11.5^{mm} long; breadth, 4.5^{mm} ; length of body-whorl, 7.10^{mm} ; its breadth, 4^{mm} ; length of aperture, 5^{mm} ; its breadth, 2^{mm} .

This species is found off Martha's Vineyard to Labrador! It is not uncommon in Eastport harbor and the Bay of Fundy, where I dredged it in 1864, 1865, 1868, 1870, in 15 to 80 fathoms. By the U. S. Fish Com. it has been dredged in Halifax harbor, in 20 to 25 fathoms, 1877; George's Bank, 45 fathoms, 1872; Gulf of Maine at Cashe's Ledge, 30 to 40 fathoms, 1874; off Cape Ann, 38 to 40 fathoms, 1874; Casco Bay, 1873; Massachusetts Bay, 31 to 48 fathoms, 1877, 1879; off Cape Cod, 30 to 122 fathoms, 1879; off Chatham, Mass., 16 fathoms, 1881; off Martha's Vineyard, 255 fathoms, 1881. It appears to occur on the coast of Greenland: Jeffreys records it (as *P. pyramidalis*) from 5 to 57 fathoms.

This species, when eroded, is liable to be confounded with *B. cancellata*. It differs from the latter in having the whorls evenly rounded; in its much finer spiral sculpture; and in the shape of the aperture and canal.

Whether it can be identified accurately with any European species is doubtful. Many writers have considered it identical with *B. pyramidalis* (Ström). But the shell figured under that name by Prof. G. O. Sars appears to be quite different.

Mörch, in 1875, gave a subspecies, *pleurotomaria*, under *P. pyramidalis* Ström, from Greenland, and referred to it *De-francia VahlII* Möller, as a synonym.

Bela decussata (Couth.) H. and A. Adams.

Pleurotoma decussata Couthouy, Boston Journ. Nat. Hist., ii, p. 183, pl. 4, fig. 8 1839 (non Lam., nec Macgill.)

Gould, Rep. on Invert. of Mass., 1st ed., p. 280, fig. 185, 1841.

Mangelia decussata Stimpson, Shells New Eng., p. 49, 1851.

Bela decussata Gould, Rep. on Invert. of Mass., Binney's ed., p. 354, fig. 623, 1870.

PLATE XLIII. FIGURE 13.

Shell small, ovate-fusiform, with a tapering spire of moderate length, scarcely turreted. Whorls six or seven, well-rounded, moderately convex, constricted above the sutures, round-shouldered, not carinated; subsutural band defined only by the curvature of the ribs, suture well-impressed, not very oblique. Ribs numerous, about 24, close, rounded, not very prominent, most so at the shoulder, about as broad as their interspaces, sigmoid, usually strongly excavated at the shoulder and abruptly incurved at the suture; they fade out

at about the middle of the last whorl. Fine, wavy, spiral cinguli cover the whole surface, crossing the ribs as well as their interspaces; on the subsutural band they are finer and often nearly obsolete; on the shoulder and more convex part of the whorls they are fine and close, separated by fine, deep grooves of about the same width; more anteriorly, and especially on the last whorl, they become a little coarser and more distant, with wider interspaces, in which a finer cingulum is often interpolated. The cinguli are roughened by fine lines of growth.

Aperture ovate-elliptical, its inner side expanded in the middle. Outer lip with a well-marked sinus close to the suture; below this, evenly convex, scarcely incurved at the canal, which is very short, straight, and open. Columella nearly straight in the middle.

Color white or pale pink.

A specimen of good size and average form is 9.10^{mm} long; breadth, 4.5^{mm}; length of body-whorl, 6.4^{mm}; its diameter, 4^{mm}; length of aperture, 4.5^{mm}; its breadth, 2^{mm}. An unusually large specimen, from Eastport, Me., is 12.5^{mm} long; breadth, 6^{mm}.

This shell is not uncommon on the New England coast, in moderate depths, mostly in 25 to 75 fathoms. Its range is from off Martha's Vineyard, in 34 fathoms, northward to Labrador. In the Bay of Fundy, where it is not rare, I have taken it in 20 to 100 fathoms, in 1868, 1870, 1872. It has been dredged by U. S. Fish Com. parties in Halifax harbor and off Nova Scotia, 16 to 59 fathoms, 1877; Gulf of Maine, in many localities, 27 to 86 fathoms, 1873, 1874, 1877; off Cape Ann, 38 to 75 fathoms, 1878; Massachusetts Bay, 25 to 26 fathoms, 1878, 1879; off Cape Cod, 28 to 30 fathoms, 1879; off Martha's Vineyard, station 991, 34 fathoms, 1881.

According to Dr. P. P. Carpenter, this species was identified from the North Pacific (Seniavine Straits and Awatska Bay, 10 to 20 fathoms, N. Pacific Expl. Exp.) by Dr. A. A. Gould.

Jeffreys formerly identified our shell with *B. Trerdyana*, but subsequently (Ann. and Mag. Nat. Hist., April, 1876, p. 329), he changed his opinion and considered it the same as *B. viridula* (Möller) of Greenland, and records it from Greenland, 5 to 100 fathoms (Valorous Exp.), and north of Scotland, 560 fathoms (Porcupine Exp.). I am unable to verify the Greenlandic and European localities. *B. viridula* of G. O. Sars seems to be a distinct species,

Variety, *tenuicostata*.

? *Bela tenuicostata* G. O. Sars, op. cit., p. 237, pl. 17, figs. 1 a, b, pl. ix, fig. 6 (dentition), 1878.

Bela tenuicostata (pars) Verrill, Amer. Journ. Sci., xx, p. 391, Nov., 1880.

Verrill, Proc. U. S. Nat. Mus., iii, p. 365, 1880.

This is closely related to *B. decussata* Couth., of which it is, perhaps, only a variety. It has smaller and more numerous ribs, and is, therefore, more finely and uniformly cancellated. It agrees with *B. decussata* very closely in size and form and in the flexuous character of the ribs.

Specimens apparently identical with this form were dredged by me, in moderate depths, at Eastport, Me., in 1864, 1868 and 1870. I am inclined to believe that these American examples, at least, are nothing more than a variety of *B. decussata*, with unusually regular and finely decussated sculpture.

Variety, *pusilla*, nov.

A small variety of this species occurs in which the ribs are less prominent and not so much bent at the shoulder, giving the shell a smoother appearance. In form of the whorls and aperture, and in the spiral cinguli it agrees with the ordinary form. It resembles the European *B. Trevelyana*, but is shorter and less decidedly cancellated.

This was taken in Casco Bay, 12 to 15 fathoms; Halifax harbor, 18 fathoms.

Bela decussata is a well-characterized species, but has, undoubtedly, been confounded with other species, especially with *B. incisula* V., which it resembles in size and somewhat in form, but from which it differs very decidedly in sculpture, and in lacking the angular shoulder of that species.

When eroded, small specimens are liable to be mistaken for *B. bicarinata*, or its variety, *violacea*, but it is generally stouter in form, with a shorter spire, and lacks the raised cinguli, usually seen in the latter.

Bela bicarinata (Couth.) Verrill.

Pleurotoma bicarinata Couthouy, Boston Journ. Nat. Hist., ii, p. 104, pl. 1, fig. 11, 1839.

Gould, Invertebrata Massachusetts, ed. i, p. 281, fig. 186, 1841; ed. ii, p. 349, fig. 618.

Verrill, Report Invert. Vineyard Id., p. 638 [344], pl. 21, fig. 106, (after Gould).

Mangelia bicarinata Stimpson, Shells of New England, p. 49, 1851.

Defrancia bicarinata H. and A. Adams, Genera Recent Mollusca, i, p. 95, 1858.

Bela bicarinata G. O. Sars, Mollusca Arcticæ Norvegiæ, p. 237, pl. 16, figs. 11, 12, pl. ix, fig. 7, (dentition), 1878.

Bela bicarinata (continued.)Variety, *violacea* (Mighels and Adams).

Pleurotoma violacea Mighels and Adams, Proc. Boston Soc. Nat. Hist., i. p. 50, 1841:

Boston Journal Nat. Hist., iv. p. 51, pl. 4, fig. 21, 1842.

Defrancia cylindracea, D. Beckii and D. livida Möller, Ind. Moll. Grönl., Krøyer's Tidss., iv, pp. 86, 87, 1842.

Mangelia violacea Stimpson, Shells New Eng., p. 49, 1851.

Bela violacea H. and A. Adams, Genera Recent Mollusca, i. p. 95, 1858.

Gould, Rep. on Invert. of Mass., Binney's ed., p. 353, fig. 622.

(G. O. Sars, Mollusca Reg. Arcticæ Norvegiæ, p. 238, pl. 17, figs. 2, 3; pl. ix, fig. 8, (dentition), 1878.

Pleurotoma groenlandica and *P. rugulata* Reeve, (t. Jeffreys).

PLATE LVII, FIGURES 16, 16a.

Shell rather small, ovate-fusiform, with a moderately high, tapering spire, varying considerably in the proportion of length to breadth. Whorls six or seven, rounded, slightly obtusely shouldered on the lower whorls, at some distance below the suture, but more decidedly carinate-shouldered on the upper ones; ribs rudimentary or absent. The subsutural band is well-marked, sloping regularly from the suture to the shoulder, and usually crossed by numerous more or less distinct riblets, which are strongly excurved, and coincident with the lines of growth; on the upper whorls these riblets are more evident, a little prominent, and often cross the carina and extend below the shoulder, but usually only to a small extent; on the lower whorl the riblets, even on the subsutural band, are obsolete or cannot be distinguished from the lines of growth, which are fine and wavy. On the upper whorls, below the nuclear ones, there are usually two strong, raised, spiral cinguli, the upper one forming the carina of the shoulder; the other is about midway between the shoulder and the suture; between and below these are others that are finer, but of the same character, the total number, on the penultimate whorl, being usually seven or eight; one of these occasionally becomes as large as the two carinae; on the last whorls the cinguli become more uniform in size, and more numerous, so that usually only the carina at the shoulder is distinguishable from the rest of the cinguli, and in var. *violacea*, even this is not always distinctly larger; on the subsutural band, there are fine, spiral lines, either just above the shoulder, or over the whole surface. The spiral cinguli are usually alternately larger and smaller, and are everywhere crossed by the lines of growth, which are sometimes so strong as to produce a finely cancellated appearance, under a lens. On the lower whorls the cinguli are sometimes so close that they are only separated by fine, impressed or incised spiral grooves.

The nucleus is prominent, the apical whorl is distinctly raised and a little incurved, nearly smooth, pale; on the second whorl two spiral carinae appear, and on the third these become strong and are crossed by riblets. Slight, but distinct, nearly straight ribs are often present on the upper whorls, below the shoulder.

Aperture small, narrow-elliptical; outer lip with a well-marked, concave posterior sinus, below which it projects forward and is broadly rounded, and is scarcely incurved at the base of the canal, which is very short, straight, and open, truncate at the tip. Columella decidedly excavated in the middle.

Color, when fresh, commonly deep chestnut-brown, varying to pale chestnut, sometimes more or less violaceous brown; the canal and columella are usually pale.

Variety, *violacea* (Mighels and Adams).

This differs from the typical form only in being a little larger and stouter and in having the two carinae on the upper whorls somewhat less evident (partly owing to erosion). The variety is connected with the typical form by intermediate specimens of every degree.

I have collected numerous specimens of this form in Portland harbor, at the precise spot where it was first found by Dr. Mighels, in 1841, and have them now before me. They belong to the stouter and smoother form of this species, of rather large size, dark colored, with a slightly bluish tint, and all have the upper whorls more or less eroded, so as to appear smoother than is natural.

As a general fact, it may be said that the young of this species, when perfect, have been classed as *B. bicarinata*, while the adult, or eroded young, have been named *B. violacea* by conchologists. The uncini of the two forms, as figured by G. O. Sars, do not essentially differ.

An adult specimen, with seven whorls, form *violacea*, is 11^{mm} long; breadth, 5^{mm}; length of body-whorl with canal, 7^{mm}; breadth, 4.2^{mm}; length of aperture, 5^{mm}; its breadth, 2^{mm}. A specimen of the typical form is 8.5^{mm} long; breadth, 3.75^{mm}; length of aperture, 4^{mm}; its breadth, 1.5^{mm}.

This species has a very extensive distribution. On our coast it is found from Cape Cod to Labrador! And in depth, from just below low-water mark to 110 fathoms! Greenland, 5 to 57 fathoms,—Jeffreys; Spitzbergen,—Torell and others; Iceland,—Mörch and others; Norway,—G. O. Sars; north of Hebrides and west of Ireland, 170 to 420 fathoms, Lightning and Porcupine Expeditions,—Jeffreys.

I have often dredged both the typical form and the var. *violacea* in Eastport harbor and the Bay of Fundy, in 10 to 50 fathoms, 1864, 1868, 1870. Messrs. Smith and Harger took large specimens of var. *violacea* on George's and LeHave Banks, 45 to 60 fathoms, on the "Bache," 1872. It has also been taken by the U. S. Fish Com. parties in Casco Bay, 1873; Gulf of Maine, 110 fathoms, 1874 (typical form); off Cape Ann, 38 fathoms (typical), 1878; Massachusetts Bay and off Cape Cod, 27 to 31 fathoms, 1879; Halifax harbor, 16 to 33 fathoms (both forms), 1877; off Martha's Vineyard, 28 fathoms. The Gloucester fishermen have brought it in from the banks off Nova Scotia (lots 626, 642).

This species occurs mainly on hard bottoms, of sand, gravel, pebbles and shells; but I have also taken it on muddy bottoms. We have not yet taken it in our deep-water dredgings, off Martha's Vineyard, though it will probably be found there hereafter.

Except when eroded, this species is scarcely liable to be confounded with any other of our coast. Worn specimens may easily be confounded with *B. decussata*, which it often resembles in size and form.

The two following species probably have not actually been found on the New England coast:

Bela Trevelyana (Turton).

Bela Trevelyana H. and A. Adams, Genera Rec. Moll., i, p. 92, 1858.

Verrill, Proc. U. S. Nat. Mus., iii, p. 365, 1880.

Pleurotoma Trevelyana Jeffreys, British Conchology, vol. iv, p. 398, 1867; vol. v, p. 222, pl. 91, fig. 8, 1869; Ann. and Mag. Nat. Hist., p. 332, 1876.

? *Bela Trevelyana* G. O. Sars, Moll. Arctiæ Norvegiæ, p. 235, pl. 16, fig. 13, pl. ix, fig. 4.

This European species has been recorded by Jeffreys from the Gulf of St. Lawrence (coll. J. F. Whiteaves). I have seen no American specimens that I can refer to it, without much doubt. A few small specimens, taken off Nova Scotia, in 1877, have a strong resemblance to some forms of the European *B. Trevelyana*, and may, possibly, prove to be identical.

Bela Sarsii Verrill.

Bela cancellata G. O. Sars, op. cit., p. 224, pl. 23, fig. 31, pl. viii, fig. 9 (*non* Coutouy).

Bela Sarsii Verrill, Proc. U. S. Nat. Mus., iii, p. 364, 1880.

The name, *Sarsii*, was proposed by me for the species described and figured by Professor G. O. Sars as *B. cancellata*. It is a small, strongly sculptured, elongated species, with moderately convex, ob-

tusely shouldered whorls, and is especially distinguished by its few broad and strong, nearly straight ribs, crossed by rather distant revolving grooves, giving it a coarsely cancellated, or tessellated, surface. The uncini differ decidedly from those of *B. cancellata*.

This species has not yet been found on the New England coast. I have a specimen from Labrador, in poor condition, that may be identical, but it is doubtful.

Tromso, 10 to 12 fathoms,—G. O. Sars.

The three following species are still doubtful:

***Bela rosea* Sars.**

? *Defrancia Woodiana* Möller, Ind. Moll. Grönl., Kröyer's Tidss., iv, p. 86, 1842.

Pleurotoma rosea M. Sars.

Bela harpularia G. O. Sars, Moll. Reg. Arcticæ Norvegiæ, p. 234, pl. 16, fig. 17, pl. ix, fig. 3 a-c (dentition), 1878 (*non* Conthouy).

Bela harpularia, var. *rosea* G. O. Sars, op. ult. cit., p. 234, pl. 23, fig. 10.

The shells that I refer to this species agree well with the figures and description by G. O. Sars. They resemble *B. harpularia*, but I think them clearly distinct. In this species the aperture is narrower; the straight canal is narrower and longer; the columella is more flattened; and the whorls are more distinctly and decidedly shouldered than in *B. harpularia*. The shoulder is, in fact, usually angularly carinated, and rendered more or less nodulous by the prominent ribs, which are fewer, and less rounded and thickened along the edge, their intervals being rather wide and concave; in crossing the subsutural band the ribs are smaller and excurved, though nearly straight below the shoulder. The spiral cinguli are coarser and less numerous than in *B. harpularia*. The spire is more acute at tip, the first nuclear whorls being small and prominent; the second turn has two prominent carinae; the third has about three spiral carinae crossed by small riblets. The posterior sinus of the lip is well-marked. The color is usually pink or pinkish-white. One of the larger specimens is 12^{mm} long; breadth, 5.5^{mm}; length of body-whorl, 8^{mm}; of aperture, 6^{mm}; breadth of aperture, 2^{mm}.

Halifax harbor, 15 to 25 fathoms; off Halifax, 9 miles, 57 fathoms,—U. S. Fish Com., 1877.

***Bela elegans* (Möll.).**

Defrancia elegans Möller, Kröyer's Tidss., iv, p. 86, 1842.

Pleurotoma elegans Jeffreys, Ann. and Mag. Nat. Hist., April, 1876, p. 331 (*non* Donovan, nec By., nec Brown, nec Scacchi).

Bela elegans G. O. Sars, Moll. Arcticæ Norvegiæ, p. 225, pl. 16, fig. 15, pl. viii, fig. 12 (dentition).

Jeffreys records this species from the Gulf of St. Lawrence (coll. Whiteaves), and from Greenland and Iceland. The shell intended may be only a variety of *B. cancellata*. Jeffreys, in the paper quoted, erroneously referred the latter to *B. Pingelii*. He states, however, that he has examined Möller's original specimens.

Bela angulosa G. O. Sars.

Op. cit., p. 227, pl. 16, fig. 16, pl. viii, fig. 10, 1878.

From Principal J. W. Dawson I have received a shell, dredged by him off Metis, mouth of the St. Lawrence River, which agrees very closely with Sars' description and figure of this species.

It is a very slender species with six whorls; the whorls are carinate-shouldered, and crossed by rather distant, large, angular ribs, very prominent at the shoulder, strongly excurved just above the shoulder, and becoming small on the subsutural band. Spiral lines numerous and fine, not present on the subsutural band. Aperture long and narrow; outer lip angulated, with a distinct sinus. Canal rather long, narrow, straight. Color white.

Length, 10^{mm}; breadth, 4^{mm}; length of body-whorl, 7^{mm}; length of aperture, 5^{mm}; width, 1.5^{mm}. This resembles the preceding species, but is more slender, with a narrower canal. The spiral lines are absent from the subsutural band.

Taranis Mörchii (Malm) Jeffreys.

Trophon Mörchii Malm, Göteborgs Videns Vett. Samh. Hand., iii, pl. 2, fig. 5, 1863, (t. Norman).

Taranis Mörchii (Malm) Jeffreys, Ann. and Mag. Nat. Hist., v, 1870.

G. O. Sars, Moll. Reg. Arcticæ Norvegicæ, p. 220, pl. 17, fig. 8.

Taranis Mörchii? Verrill, Amer. Journ. Sci., xx, p. 391, Nov., 1880; Verrill, Proc. U. S. Nat. Mus., iii, p. 368, 1880.

Dall, Bulletin Mus. Comp. Zoology, ix, p. 70, 1882.

Pleurotoma cirratum Brugnone, Mem. Pleur. foss., 1862 (t. Monterosato), (non *P. cirrata* Bellardi, 1847).

Taranis cirrata Monterosato, Enum. c. Sinon., p. 41; Conch. della Zona degli Abissi, Bull. Soc. Malac. Ital., vi, p. 74, 1880.

Taranis cirratus Jeffreys, Rep. Brit. Assoc., 1880, [p. 9].

PLATE LVII, FIGURE 18.

Shell small, angular-fusiform, with a moderately elevated, acute spire. Whorls six, strongly angulated and slightly carinated near the middle; the wide subsutural band, above the carina, slopes regularly and is flat, or a little concave.

A young specimen (fig. 18), having five whorls, has five revolving, nodulous carinae on the body-whorl: one close to the suture; the sec-

ond and most prominent forms the carina of the shoulder; the other three are on the anterior half; some faint additional ones appear on the canal; the three preceding whorls have the subsutural and the sharp median carina, and usually the third carina is more or less exposed at the suture. Between the first and second carinae the surface is flat or slightly concave. The whorls are crossed by numerous thin, delicate, flexuous, regularly spaced, raised riblets, which are conspicuous between the carinae, and produce sharp nodules where they cross them. The nucleus is small, rounded, light chestnut-brown, minutely cancellated with microscopic lines running in two directions. Sinus of the lip shallow, rounded. Length, 4^{mm}; breadth, 2^{mm}.

A larger specimen, with six whorls, has, on the last whorl, seven regular, thin, elevated, well-spaced, spiral cinguli, between the carina of the shoulder and the base of the canal, and additional finer ones on the canal; a faint one also appears on the middle of the subsutural band. The body-whorl is crossed by numerous, regular, distinct, but fine, curved riblets, or raised lines of growth, which are excurved on the canal, angulated and excurved at the shoulder, and incurved at the suture. The canal is a little curved, short, narrow, a little constricted at its base by the incurvature of the outer lip.

Length, 4.50^{mm}; breadth, 2.25^{mm}.

Two examples were taken at station 894, in 365 fathoms, off Newport, R. I., 1880; another was dredged at station 994, in 368 fathoms, 1881,—U. S. Fish Com. Gulf of Mexico, 895 fathoms,—“Blake” Exp. (t. Dall.)

Taranis pulchella Verrill.

Taranis pulchella Verrill, Proc. U. S. Nat. Mus., iii, p. 368, 1880.

PLATE LVII, FIGURE 17.

A smaller and more slender species than the preceding, with a much smaller nucleus, a more acute spire, and with the carinae sharp, but not nodulous.

Whorls seven, angular, the lower ones carinated and shouldered. Body-whorl with six revolving carinae, besides one or two on the canal; one is just below the suture; the three largest surround the middle; the median one is most prominent. Between the subsutural and second carinae the space is concave and crossed by numerous elevated, thin, curved riblets, corresponding to the labial sinus; similar but less prominent and less curved riblets cross the interspaces between the other carinae, but do not cross the carinae themselves.

Penultimate whorl with the subsutural and two median carinae. Preceding whorls without distinct carinae, except the subsutural one, but with the curved, transverse, raised riblets well-developed. Nuclear whorls very small (surface eroded). Aperture narrow, angular; canal short, slightly turned to the left; outer lip with a distinct, evenly rounded sinus below the subsutural carina. Columella slightly curved and flattened.

Length, 2.20^{mm}; breadth, .90^{mm}; length of body-whorl, 1.40^{mm}; of aperture, .95^{mm}.

Off Martha's Vineyard, station 892, in 487 fathoms, one specimen, —U. S. Fish Com., 1880.

Mangilia cerina Verrill.

Pleurotoma cerinum Kurtz and Stimpson, Proc. Boston Soc. Nat. Hist., iv, p. 115, 1851; Stimpson, Shells of New England, p. 49, pl. 2, fig. 2, 1851.

Mangilia cerina Verrill, Amer. Journ. Sci., iii, p. 210, 1872; Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, p. 637, description, 432, (auth. ed. p. 343), 1874.

This shell is easily distinguished by its slender form, with the whorls angularly shouldered, and having a wide, concave, subsutural band. The ribs are few, angular, thick, obtuse. The whole surface is covered by fine, spiral lines, minutely decussated by the lines of growth. Lip with a well-marked sinus below the suture, near the shoulder. Nucleus with the apical whorl regular, smooth, and very small, depressed; the second whorl is crossed by fine riblets, then two spiral grooves appear around the middle; on the third whorl there are three spiral grooves, and the riblets are more prominent, producing a decussated sculpture. On the fourth whorl the normal sculpture appears.

Fig. 1.



This species was erroneously omitted from Binney's edition of Gould's Invertebrata.

It is found near Newport, R. I., and in Long I. Sound, Vineyard Sound, Buzzard's Bay, etc., in 3 to 12 fathoms. It extends southward to the South Carolina coast. On the New England coast it is a rare shell, only found in our warmest waters.

The animal has not been examined.

RHACHIGLOSSA.

Marginella carnea Storer (?).

Marginella carnea Storer, Journal Boston Soc. Nat. Hist., i, p. 465, pl. 9, figs. 3, 4, 1837.

Marginella roscida ? Verrill, Amer. Journ. Sci., xx, p. 391, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 369, 1880.

Our shell has a somewhat higher and more acute spire than the one figured by Storer, and the callus does not reach its summit. There are four prominent folds on the columella, the two anterior ones very oblique. The color is not preserved.

A single dead specimen, closely resembling this species, was taken off Martha's Vineyard, at station 865, in 65 fathoms, 1880. Another specimen, also dead, but more perfect, was taken, in 1881, at station 949, in 100 fathoms. Key West, Florida,—Storer.

Buccinum Linné (restricted); Lam., 1801.

Tritonium (pars) Müller; Lovén; Mörch.

Gould recognized three species of this genus in his report on the Invertebrata of Massachusetts, viz: *B. undatum*, *B. Donovani*, and *B.* ciliatum*. The last two he only knew from the Grand Bank. The first is very abundant on the northern coasts of New England, both between tides, as at Eastport, Me., and Grand Menan I., and at all depths down to 50 fathoms or more, on hard bottoms, of sand or stones. It extends southward, along the coast, in equal abundance, in moderate depths, as far as the region off Chesapeake Bay, where it was taken in great numbers, and of large size, in 31 to 57 fathoms, by Lieut. Z. L. Tanner on the "Fish Hawk," in 1880. It varies greatly in different localities, and many varietal names have been proposed by European writers for the corresponding European forms.*

Dr. Wm. Stimpson and others have considered our species distinct (as *B. undulatum*) from the European *B. undatum*. Our littoral northern variety is certainly very different, as a variety, from the common shallow-water form of Great Britain, but the latter can be almost exactly matched by our specimens dredged abundantly on the

* The various species of *Buccinum* are notoriously variable and difficult to identify. The nucleus and upper whorls often afford excellent characters for separating some of the difficult species. It is, therefore, unfortunate that conchologists have seldom accurately described or figured the apex. The operculum, also, often affords good characters, in this genus.

sandy bottoms, off Cape Cod and south of Martha's Vineyard, while our littoral variety seems to have its counterpart on the northern coasts of Norway and Finmark.

B. Donovanii, hitherto not known south of the Grand Bank, Stimpson and many others have regarded as a valid species. Jeffreys (Annals and Mag. Nat. Hist., 1880) considers it a variety of *B. glaciale* Linné, but he refers Gould's shell to *B. Grönlandicum* = *B. cyaneum*. Metis, R. St. Lawrence! (coll. Dawson.)

According to Dr. Stimpson, Gould had included, in his collection, three distinct species under the name of *B. ciliatum*, one of which is the true *ciliatum* (Fabr.), but his description and the figure (in ed. I) apply more particularly to *B. Gouldii* V. The new figure, in ed. II, represents a different form.

Two northern species, not previously supposed to occur so far south, have been dredged by us, living, in considerable numbers, in the New England region, viz: *B. cyaneum* and *B. tenue*.

All these species were described in detail by Dr. Wm. Stimpson, in his Review of the Northern Buccinums,* in 1865.

The following additional species, apparently undescribed, occurred in deep water off Martha's Vineyard.

Buccinum Sandersoni Verrill, sp. nov.

PLATE LVIII, FIGURE 9.

Shell elongated, brownish, translucent, rather thin and delicate, with a high spire; well-impressed suture; strongly convex, obliquely ribbed and strongly spirally sculptured whorls; a large smooth, mammillary nucleus; a small aperture; and a short, nearly straight columella.

Whorls, in our largest example, seven, a little flattened below the suture, strongly convex in the middle; the penultimate whorl with about 13, broadly convex, curved ribs or undulations, strongly excurved at the middle of the whorl; on the body-whorl the ribs are less prominent and fade out below the middle; on the three upper whorls they are absent. The spiral sculpture, on the lower whorls, consists of prominent, narrow, rounded cinguli, unequal in size and separated by narrow grooves; usually there are three or four smaller and lower cinguli, between two of the larger ones, and sometimes a narrow groove appears on the larger ridges, dividing them into two;

* Canadian Naturalist, ii, pp. 364-389, Oct., 1865.

on the anterior part of the body-whorl the cinguli become more uniform in size and more numerous. On the second and third whorls the cinguli are large, regular, very prominent, and nearly equal, separated by deep concave grooves or sulci, about twice as wide; on the second whorl there are about 9 of these spiral cinguli; on the third whorl a few smaller ones begin to appear in the interspaces near the suture, and on the fourth whorl most of the grooves, have one or two small cinguli; the nine or ten larger primary cinguli can still be distinguished on the body-whorl. The whole surface is covered with fine, distinct lines of growth which decussate the cinguli and mostly cross the ribs somewhat obliquely. The nucleus is rounded and remarkably large for the genus (2^{mm} in diameter), translucent glossy brown, nearly smooth for about one turn and a half; the apex is regular and not obliquely raised.

The aperture is unusually small and short, elliptical, a little contracted posteriorly; outer lip thin, well-rounded, the edge receding in a broad curve below the suture; canal short and narrow; columella rather straight, thin, with the folds slightly developed; the anterior end thin, rounded and projecting quite as far as the lip; the upper part of the columella-lip is not excavated, nor distinctly excurved. The operculum is small, pale yellow, rounded-elliptical, with the nucleus at about the middle of the length and a little to one side of the centre. Epidermis thin and smooth. Color of the shell, with epidermis, yellowish brown, to dark reddish brown, sometimes with small paler spots on the larger spiral ridges; columella whitish, inside of aperture pale orange-brown, or light amber.

Our largest example (female) is 46^{mm} long; breadth, 21^{mm} ; length of body whorl 29.5^{mm} ; length of aperture, 21.5^{mm} ; its breadth (lip broken), 12^{mm} ; length of operculum, 11.5^{mm} ; its breadth 9^{mm} . A male has very nearly the same proportions.

Off Martha's Vineyard, station 939, in 258 fathoms; station 1032, in 208 fathoms, 1881; three living examples, male and female.

This species resembles some of the varieties of *B. undatum*, but besides its more slender and elongated form and more delicate texture, it differs decidedly in the character of the spiral sculpture, the shortness and small size of the aperture, and in the operculum; but the most striking differences are in the nucleus and upper whorls, for the nucleus is more than twice as large as that of *B. undatum* (fig. 10), and different in character, on the second and third whorls the spiral cinguli are fewer, and very much more prominent and coarser. The character of the nucleus and upper whorls will also distinguish

it from *B. cyaneum* and all the other species of our coast. In the form of the aperture and columella it resembles *B. cyaneum*.

I have named this interesting shell in honor of Mr. Sanderson Smith, of the U. S. Fish Commission parties, during these explorations.

Buccinum cyaneum Brug.

Buccinum cyaneum Bruguière, Eneye. Meth., Vers., i, 266, 1792. (t. Stimp., Jeffreys.)

Beek, in Möller, Krøyer's Tidsskrift, iv, 84, 1842.

Reeve, Conch. Icon., iii, Buc., ix, p. 69, 1846. (t. Stimp., Jeffr.)

Buccinum boreale Leach, Jour. de Phys., etc., lxxviii, p. 464, 1819. (t. Stimp.)

Gray, Zool. of Beechey's Voy., p. 128, 1839. (t. Stimp., Jeffreys.)

Brod. and Sow., Zool. Journ., iv, p. 375, 1829.

Buccinum cyaneum Stimpson, Review Northern Buccinums, Canadian Nat., ii, p. [19], Oct., 1865.

Verrill, Amer. Journ. Sci., xvi, p. 210, 1878; Proc. Nat. Mus., iii, p. 371, 1880.

Buccinum sericatum Hancock, Ann. and Mag. Nat. Hist. [1], xviii, p. 328, pl. 5, fig. 6, 1846. (t. Stimp., Jeffr.)

Buccinum tenebrosus Hancock, Ann. and Mag. Nat. Hist. [1], xviii, p. 327, 1846. (t. Stimpson). (*non* Möller).

Tritonium grönländicum Möreh, in Rink's Grönland, Tillæg, Aft., 84, 1857 (t. Stimp., Jeffr.)

Buccinum grönländicum G. O. Sars, Mollusca Reg. Arcticæ Norvegiæ, p. 259, pl. 13, figs. 9, 9a, pl. 25, figs. 1, 2, pl. x, fig. 11, a-b (dentition), 1878. (*non* Stimpson).

Jeffreys, Ann. and Mag. Nat. Hist., Apr., 1876, p. 323 (animal described); Northern Species of *Buccinum*, Ann. and Mag. Nat. Hist., vi, p. 424, Dec., 1880.

Friele, Catal. Norweg. Nordm. Exp. Spitzb. Moll., p. 278, pl. 7, figs. 1-7 (dentition).

Variety, *Perdix*, or *Finmarchianum*.

Tritonium grönländicum, var. *perdix* (Beek) Möreh, Faun. Moll. Islandiæ, p. 211, 1868.

Tritonium grönländicum, var. *glabra* Möreh, Cat. Moll. Spitzberg, p. 14 (description), 1869.

Buccinum finmarchianum Verkrüzen; G. O. Sars, Mollusca Reg. Arcticæ Norvegiæ, p. 262, pl. 13, fig. 10, pl. 25, figs. 3, 4, pl. x, fig. 12 (dentition), 1878.

Buccinum grönländicum, var. *finmarchianum* Jeffreys, op. ult. cit., p. 424, 1880.

PLATE XLIII. FIGURE 5. PLATE LVIII. FIGURE 11.

This species was dredged by us in the summer of 1877, on the U. S. Fish Com. steamer "Speedwell," off Cape Sable, Nova Scotia, in 82 to 91 fathoms, fine, compact sand, where it was common, and off Halifax, in 100 fathoms. In 1879, we also took it about 15 miles east from Cape Cod, in 70 to 90 fathoms. This was the first instance of its occurrence on the New England coast. It was taken on Le Have Bank, in 45 fathoms, by Messrs. S. I. Smith and O. Harger, on the "Bache," in 1872. It has often been brought in from the banks

off Nova Scotia, and from the Grand Bank, by the Gloucester fishermen. Gulf of St. Lawrence, off Metis (coll. Dawson).

Some of our specimens belong to the dark variety, *tenebrosus* Han.; others are near the variety *Finnmarchianum* Verkrusen. The variety *parvix* or *glabra* Mörch (Catal. Moll. Spitzberg, p. 14, 1869), is probably the same thing as the latter.

Our specimens vary considerably in color and in sculpture. They mostly have light shades of brown or yellowish brown, varied with lighter and darker tints, and mostly with the principal revolving cinguli darker brown, interrupted by pale spots, the whitish spots often wider than the spiral lines; interior light yellowish brown or salmon, the external colors often showing through; columella whitish. Epidermis thin, closely lamellose along the lines of growth, and in the freshest and young alcoholic specimens with rows of fine, short hairs along the revolving cinguli; these are usually rubbed off from dried specimens. Whorls seven, well-rounded, often obscurely shouldered; suture impressed.

Many of the specimens are entirely without undulations or ribs; others have 12 to 15 short but distinct ones, most prominent close to the suture, mostly only slightly flexuous, fading out on the convexity of the whorl, or passing insensibly into the lines of growth, which are usually raised and very distinct, receding strongly at the shoulder, or on the convexity of the whorls.

The spiral sculpture consists of numerous, close, unequal, wavy, slightly raised cinguli, separated by fine, narrow, impressed grooves; usually there are, on the lower whorls, ten to twelve larger and slightly more raised cinguli, between which there may be three to five smaller and lower cinguli, varying among themselves in size and height, and becoming still more numerous on the last whorl; the largest of these cinguli are not very prominent, and are more or less angular, and the grooves between are shallow and not sharply cut. These grooves are finely decussated by the thin, close, raised lines of growth, which also cross the cinguli, giving them a minutely wavy appearance.

The nucleus is a little prominent, with its suture impressed; the apical whorl is small, regularly spiral, smooth, glossy yellowish or chestnut-brown; about eight fine, spiral cinguli, with their interstices decussated by the lines of growth, begin on the second whorl; on the third whorl there are about twelve of these, and they begin to be alternately larger and smaller.

Aperture short, irregular, rather small; outer lip with a well-

marked sinus below the suture, in adult shells, and then a little ex-curved and thickened; below this, broadly rounded, often somewhat expanded anteriorly and usually extending somewhat beyond the end of the columella; canal short, obliquely truncated, not very wide; columella-lip regularly arched above the middle, not excavated; columella smooth, nearly straight in the middle, a little receding, thin and evenly rounded at the end; plications quite obsolete, or very nearly so. Operculum irregularly elliptical, obliquely narrowed at the right end, its nucleus excentric, nearest the broad end, and not far from the edge.

A female, of the ordinary size, from off Cape Sable, N. S., is 43^{mm} long; breadth, 25^{mm}; body-whorl, to end of columella, 30^{mm}; its breadth, 20^{mm}; length of aperture, 23^{mm}; its breadth, 13^{mm}; length of operculum, 11.5^{mm}; breadth, 9^{mm}.

Var. *patulum* (G. O. Sars).

Op. cit., p. 260, pl. 25, fig. 2.

From Murray Bay, mouth of the St. Lawrence River, Principal Dawson has sent me specimens, of a peculiar, rather small form, belonging, apparently, to this species. The aperture is unusually broad, with the lip expanded and patulous anteriorly, projecting decidedly beyond the columella. The surface is eroded, but was nearly smooth, without ribs, and with fine wavy, unequal, spiral lines, mostly indistinct; one specimen has several larger, distant, raised spiral lines. The color is dark brownish; inside of aperture purplish or livid brown.

This species appears to be circumpolar. It is common in Davis Straits and on the coasts of Greenland, Spitzbergen, Nova Zembla, Iceland, Finmark, Lapland, etc. Fossil in the Post-pliocene of Canada.

Mörch, in adopting *Gröndandicum* for this species, simply took up a part of the polynomial name used by Chemnitz, which has no claims to priority under the ordinary rules of binomial nomenclature. Stimpson, therefore, very properly rejected that name, as applied to this species, and adopted the first distinctive binomial name given to it. Jeffreys has followed Mörch in using *B. Gröndandicum*, and various other European writers have followed the same usage, apparently without sufficient reason. This has given rise to much confusion, because *Gröndandicum* has been extensively used for a very different species by Hancock, Reeve, Stimpson, and various other writers.

The *Tritonium Terra-Novæ* (Mörch) has been referred to *B. Tottenii* by Jeffreys, but Mörch himself suggested that it might be a

variety of the present species, to which some of the figures of it certainly bear a very strong resemblance.

Numerous examples of clusters of cylindrical, often very much elongated, clusters of egg-capsules have been brought from the Grand Bank by the Gloucester fishermen. These, I suppose, belong to this species, but I have no positive evidence. The clusters are usually about an inch in diameter and 3 to 5 inches long. By the fishermen, these are called "sea-corn" and "green-corn."

Buccinum tenue Gray.

Buccinum tenue Gray, Zool. of Beechey's Voy., p. 128, xxxvi, 19, 1839, (t. Stimpson).

Reeve, Conch. Ic., iii, Buc., iv, 27, 1846, (t. Stimpson).

Buccinum scalariforme Beck, in Möller. Krøyer's Tidsskrift, iv, p. 84, 1842. (t. Stimp., Jeffr.)

Packard, Canadian Naturalist, viii, 417, 1863.

Dawson, Canadian Naturalist, [2], ii, p. 88, 1845.

Tritonium scalariforme Mörch, in Rink's Grönland, Tillæg. Aftr., p. 84, 1857; Arctic Manual, p. 128, 1875.

Buccinum tenue Stimpson, Review Northern Buccinums, Canadian Nat., ii, p. [14], Oct., 1865.

Friele, op. ult. cit., pl. 7, figs. 11, 12, dentition.

Jeffreys, Ann. and Mag. Nat. Hist., Apr., 1876, p. 324 (animal described); Northern Species of Buccinum, Ann. and Mag. Nat. Hist., vi, p. 425, Oct., 1880.

PLATE XLIII, FIGURE 4.

Dredged alive, in considerable numbers, in 1877, by the U. S. Fish Com. steamer "Speedwell," off Cape Sable, N. S., in 88 to 91 fathoms, on a bottom of fine compact sand, associated with *B. cyaneum* and *Sipho pubescens*. Also off Cape Sable, 22 miles, 59 fathoms; mouth of Halifax Harbor, 21 fathoms, 9 living young; off Halifax, 9 to 12 miles, 42 to 92 fathoms. It had not been found so far south previously. These specimens all belong to a small race of the species. Gulf of St. Lawrence, Bradelle and Orphan Banks, 50 to 60 fathoms,—Whiteaves. Off Metis! (coll. Dawson.) Labrador, Greenland! Spitzbergen, Nova Zembla, Bering's Straits, (t. Stimpson). Spitzbergen, 20 to 125 fathoms,—Friele. Fossil in Post-pliocene beds at Rivière du Loup, Canada, Labrador, and coast of Hudson's Bay (t. Stimpson).

Among several specimens kindly sent to me by Principal J. W. Dawson, dredged by him off Metis, near the mouth of the River St. Lawrence, some are larger than those from off Nova Scotia. The largest is 62^{mm} long; breadth, 32^{mm}; length of aperture, 29^{mm}; its breadth, 16^{mm}.

In order to make this list more complete, I include here the following species of *Buccinum*, although they may not have been taken south of Newfoundland and the Gulf of St. Lawrence.

Buccinum Tottenii Stimpson.

Buccinum ciliatum (pars) Gould, Invert. Mass., p. 307, 1841; ed. II, p. 368, (non Fabr.)

Dawson, Canadian Nat., ii, p. 415, pl. 7, fig. 5, 1857, (non Fabr.)

Buccinum Tottenii Stimpson, Review Northern Buccinums, Canadian Nat., ii, p. [23], Oct., 1865.

Buccinum Tottenii Jeffreys, Northern Species of Buccinum, Ann. and Mag. Nat. Hist., vi, p. 425, Dec., 1880.

Friele, Catal. Norweg. Nordm. Exp. Spitzb. Moll., p. 278, pl. 7, figs. 11, 12 (dentition).

? *Tritonium terræ-novæ* Mörch, Catal. Moll. du Spitzberg, p. 14, (extract from Ann. Soc. Malacol. Belg., iv, 1869).

Buccinum terræ-novæ Leche, Kongl. Sv. Vet.-Akad. Handl., xvi, [p. 61], pl. 2, figs. 30a, b (shell), 30c, d (dentition), 1878.

Grand Bank, Newfoundland,—coll. Totten (t. Stimpson). Several specimens from the Grand Bank have been presented to the U. S. Fish Com. by the fishermen of Gloucester, Mass. Off Metis, R. St. Lawrence! (coll. Dawson.) Spitzbergen, 20 to 50 fathoms,—Leche, Friele.

By Jeffreys, *B. Terra-Nova* (Mösch) is regarded, after an examination of the original specimens, as identical with *B. Tottenii*. To judge from some of the descriptions and figures, it would appear to be a variety of *B. cyaneum*, as Mösch himself suggested. The figure given by Leche appears, however, to represent a carinated variety of *B. Tottenii*.

Buccinum tumidulum G. O. Sars.

Op. cit., p. 263, pl. 25, figs. 5, 6, pl. x, fig. 13.

This species is remarkable for the nearly smooth, ventricose whorls, for the wide extension of the enamel over the body-whorl (as in *B. hydrophanum*), and especially for the nearly round operculum, which has a central nucleus.

From the Grand Bank, I have a thin, white shell, which agrees exactly with Sars' figure in size and form, but it lacks the operculum. It has the same extension of the enamel, and is finely and closely spirally striated; close to the suture there are slight and short undulations. The columella-lip is excavated and curved as in Sars' figure.

It seems probable that this is identical with *B. tumidulum*, but I had considered it a variety of *B. hydrophanum*. Friele and Jeffreys refer *B. tumidulum* to *B. hydrophanum* Han., as a variety. The latter is described as smooth, with a smooth epidermis, and is a more elongated form, with less convex whorls. *B. Mörcchi*, Friele (Nyt. Mag. Naturv., xxiii, [p. 4], pl., figs. 7, 7a, teeth and operculum, 1877), seems to be a closely related form, and also has a roundish operculum with a central nucleus. Jeffreys unites this, also, to *B. hydrophanum*. If *B. tumidulum* Sars be really a variety of *B. hydrophanum* Han., then the latter must, apparently, be added to the list of species inhabiting the Grand Bank.

Buccinum Gouldii, nom. nov.

Buccinum ciliatum (pars) Gould, Invert. Mass., ed. I, 307, fig. 209, 1841; ed. II, p. 368, fig. 635 (?).

Reeve, Conch. Icon., iii, Buc., i, fig. 1 (non O. Fabr.), 1846, (t. Stimpson).

Buccinum Humphreysianum Stimpson, Review Northern Buccinums, Canadian Nat., ii, p. [24], Oct., 1865, (non Bennett).

This name is proposed, provisionally, for the shell figured by Gould (ed. I) and described as *B. Humphreysianum** by Dr. Stimpson. It differs from the European species, of that name, as already mentioned by Jeffreys and others, in having a ciliated epidermis and in other characters.

This shell is remarkable for its swollen, rounded whorls, the deep excavation of the columella-lip, the anterior expansion of the rounded outer lip, and the thinness and nearly smooth surface of the shell.

This shell may, perhaps, prove to be only a variety of some previously known species. In that case, *Gouldii* may still be used as a variety name, to designate the form. It does not appear to correspond with any of the forms described by European writers.

* I add references to this European shell, which, probably, has not been met with on the American coast.

Buccinum Humphreysianum Bennett.

Buccinum Humphreysianum Bennett, Zool. Journ., London, i, 398, pl. 22, upper figures, 1825.

Forbes and Hanley, Brit. Moll., iii, 410, pl. 110, fig. 1.

G. O. Sars, Mollusca Reg. Arcticæ Norvegiæ, p. 264, pl. 25, figs. 7, 8, pl. x, fig. 14 (dentition), 1878.

Jeffreys, Northern Species of Buccinum, Ann. and Mag. Nat. Hist., vi, p. 424, Dec., 1880.

Ireland,—Bennett. Greenland, Lapland, Zetland, west coast of Norway,—G. O. Sars.

A specimen that I suppose to be the young of this species is a small, very thin, translucent, pale yellow, smooth shell, with an acute spire, a very small, regularly spiral nucleus, five convex whorls, impressed suture, and excavated columella-lip. The whorls are evenly rounded and with faint traces of shallow spiral lines, no undulations. This was dredged by Messrs. Smith and Harger, on Le Have Bank, 60 fathoms, in 1872. This may possibly be the young of *B. hydrophanum*.

Leeche (op. cit., p. 59) has referred Gould's *B. ciliatum* to "*B. orum* Turton," which he also unites to *B. Dalei* (= *Liomesus Dalei* Stimp., 1865,* or *Buccinopsis Dalei* Jeffreys, 1867), but this is doubtless an error.

Grand Bank (coll. Gould) and mouth of McKenzie River, (t. Stimpson.)

Buccinum ciliatum (Fabr.) Möller.

Tritonium ciliatum O. Fabr., Fauna Grönländica, p. 401, 1780.

Mörch, in Rink's Grönland, Tillæg, Aft., p. 84, 1857; Arctic Manual, p. 128, 1875.

Buccinum ciliatum Möller, Krøyer's Tidsskrift, iv, p. 85, 1842.

Reeve, Conch. Ic., iii, Buc., v, 29, 1846, (t. Stimp.)

Gould, Invert. Massachusetts, ed. I, p. 307; ed. II, p. 368, (in part only, not the figures).

Stimpson, Review Northern Buccinums, Canadian Nat., ii, p. [11], Oct., 1865.

Jeffreys, Ann. and Mag. Nat. Hist., Apr., 1876, p. 324; Northern Species of Buccinums, Ann. and Mag. Nat. Hist., vi, p. 425, Dec., 1880.

Buccinum Mölleri Reeve, Icon., iii, 1846, (t. Stimpson, Jeffreys).

Grand Bank,—coll. Gould, (t. Stimpson). Murray Bay, mouth of St. Lawrence River, 112 fathoms, and Rivière du Loup!—coll. Dawson. Greenland, 5 to 175 fathoms,—Valorous Exp. (t. Jeffreys). White Sea, Spitzbergen, Lapland (t. Jeffreys). Bering's Straits and Arctic Ocean adjacent, and mouth of McKenzie River, (t. Stimpson).

Dr. Stimpson mentions a specimen from Nova Scotia, received from Mr. J. R. Willis, but the collection of Mr. Willis was largely

* I take this opportunity to state that *Liomesus* Stimpson should be retained for this genus, instead of *Buccinopsis* Jeffreys (Brit. Conch., iv, p. 297, 1867). The former was established in 1865 (Review Northern Buccinums, p. 4), on account of peculiarities of the dentition, which were stated, and *B. Dalei* was cited as the type. Jeffreys erred, therefore, in saying that the genus was not defined by Stimpson, as he also did in objecting to the meaning of the name, which clearly refers to the smoothness of the median plates of the radula,—not to the smoothness of the shell, as Jeffreys imagined. *Liomesus daniensis* (Sars) has, according to the figures of G. O. Sars, the same character of dentition given as distinctive of the genus by Dr. Stimpson.

derived from the bank-fisheries, and his specimen may have come from the Grand Bank.

Neptunea, Tritonofusus and Siphio.

Fusus (*pars*) Brug.; Lamarck, An. sans Vert.; Gould; Jeffreys, etc., (*non Fusus* Klein, 1753, *nec* Lam., 1801.)

Neptunea Bolten, Mus. Bolt., 1798 (*N. antiqua*).

H. and A. Adams, Genera of Rec. Mollusca, i, p. 79, 1858.

Chrysodomus Swainson, 1840 (*C. antiquus*).

Atractus Agassiz (*A. corneus*), 1837 (*non* Lap., 1833, *nec* Wagl., 1828).

Siphio (*pars*) Klein, 1753; Mörch, Catal. Yoldi, i, p. 104, 1852; (subgenus) Mörch, Nat. Bidr. Beskr. Grönland, p. 85, 1857 (*F. Islandicus*, etc.), (*non* Brown, 1827).

Tritonofusus (subgenus) Mörch, op. ult. cit., p. 85, 1857; Catal. Moll. Spitzberg, p. 15, 1869 (*F. Kroyeri*, *F. latericeus*).

Neptunella (subgenus) Verrill, Amer. Journ. Sci., vi, p. 439, 1873 (*N. pygmæus*); Rep. Invert. Vineyard Sound, p. 345 [639], 1874 (*non* Gray, *nec* Meek, 1864, fossil).

Siphonella (subgenus) Verrill, Preliminary Check List, p. 20 (*S. pygmæus*), 1879 (*non* Macq.).

Volutopsius (subgenus) Mörch, Nat. Bidr. Beskr., Grönland, p. 85, 1857 (*F. Norvegicus*).

The name, *Fusus*, was definitely restricted by Lamarck, in 1801 (Syst. des An. sans Vert., p. 82, type, *F. longicauda*), to the tropical group belonging to the Fasciolaridae (*Colus* auth.), and for that group it should be retained.

This group undoubtedly includes three or more genera, but all these generic groups have not yet been clearly differentiated, nor satisfactorily defined. Among our species, we have two that belong to typical *Neptunea*, viz: *N. despecta*, var. *tornata*, (Gould), and *N. decemcostata*. The former was known to Gould only from the Grand Bank, and northward, but we dredged it, in 1881, off Martha's Vineyard, station 949, in 100 fathoms.

From the Gloucester fishermen the typical form of *N. despecta* has also been received (lot 861). In this, the spiral carinae are much less prominent than in the var. *tornata*.

Of the group called *Siphio* by Mörch, G. O. Sars, and others, we have several species, three of which were known to Gould, viz: *S. Stimpsonii* (Möorch)* = *Fusus Islandicus* Gould (*non* Linné); *S. ven-*

* Mörch, in Faunula Moll. Ins. Færoënsium, Vid. Med. Nat. Forh., p. 83, 1867, named this species thus: "*Fusus Stimpsonii* (*F. corneus* Say, Am. Conch.)" This is, so far as known to me, the first distinctive name for the species. The name, *F. curtus*, was given by Jeffreys the same year (Brit. Conch., iv. p. 336, 1867), but it was then applied particularly to a fossil form, which may or may not be the same as a certain "North-American form" referred to in such an indefinite manner that no one but the author

tricosus (Gould); and *S. pygmaeus* (Gould). The first of these is abundant, at moderate depths, from off Long Island to Nova Scotia. It varies much in proportion of length to breadth, and in sculpture, sometimes being nearly smooth, at other times deeply and regularly spirally grooved.* *S. ventricosus* was known to Gould only from the Grand Bank, and I have seen several specimens recently brought from there by the Gloucester fishermen. Stimpson (Shells of New England) records it as from George's Bank and near Nantucket

could have been sure as to which of our three known species he had in mind. The passage referred to, which occurs in course of remarks on the distribution of *F. gracilis*, is as follows: "I do not consider the Crag specimens which have been referred to this species by Searles Wood, Woodward, and Nyst identical with the above [*F. gracilis*]. The last agree with the North-American form, which is smaller, more tumid, and has a short spire. If such prove to be distinct, it might be called *curtus*." Neither the name nor the characters given apply well to the ordinary form of *S. Stimpsonii*, which often grows to a larger size than Jeffreys gives for *S. gracilis*, and has a long, acute spire, though there is, as usual in the genus, a shorter and stouter variety. His description and name would apply better to another American form, the *Fusus ventricosus* of Gould.

For these reasons I consider it both desirable and necessary to adopt the name given by Mörch, about which there can be no doubt. Subsequently, this species was named *F. Americanus* by Bell.

As to the *smaller size* of the American shell, I think Mr. Jeffreys was mistaken. I give here a few measurements, to illustrate both the large size and the variations in proportions of *S. Stimpsonii*:

One male, out of a lot of very large specimens, from off Cape Cod, 45 fathoms, measures in length, 4.8 inches, or 121^{mm}; breadth, 2.1 inches, or 53^{mm}; length of body-whorl, 88^{mm}; its breadth, 43^{mm}; length of aperture, 71^{mm}; its breadth, 27^{mm}; length of operculum, 33^{mm}; its breadth, 20^{mm}. A large female, from the same region, is 115^{mm} long; 49^{mm} broad; length of aperture, 52^{mm}; its breadth, 25^{mm}.

An elongated specimen, of the variety *liratus*, from off Martha's Vineyard, 183 fathoms, is 82^{mm} long; breadth, 31^{mm}; length of body-whorl, 56^{mm}; its breadth, 27^{mm}; length of aperture, 42^{mm}; its breadth, 14^{mm}.

A short, stout, lightly grooved specimen (var. *brevis* V.), from off Chatham, Cape Cod, (st. 978), 17 fathoms, is 55^{mm} long; breadth, 28^{mm}; length of body-whorl, 43^{mm}; length of aperture, 35^{mm}; its breadth, 14^{mm}.

*To the strongly grooved, deep-water variety, I gave the name, *Neptunea arata* (Proc. Nat. Mus., 1880, p. 370), thinking, at that time, that it could be distinguished specifically. A much larger series, obtained in 1881, in the same region, convinced me that it is only an extreme variety, which is connected by intermediate states with the faintly grooved or nearly smooth, shallow-water forms. I have collected the latter, in abundance, even at low-water, in the Bay of Fundy. The name, *Neptunea arata*, having previously been used by Gould, I propose to designate this variety as *Sipho Stimpsonii*, var. *liratus*. If it be thought desirable to designate the shorter and stouter form of this species by a special varietal name, it may be called *S. Stimpsonii*, var. *brevis* V. All the intermediate forms occur, however.

Shoals. Probably the last-named locality is erroneous, and perhaps both are so. The short variety of *S. Stimpsonii* may have been intended.

The third species, *S. pygmaeus*,* is very abundant at moderate depths, from off Chesapeake Bay to Nova Scotia.

Several Arctic species, not mentioned in Gould's Report, have been discovered in the deeper parts of the Gulf of St. Lawrence, and in the deep channel near the mouth of the St. Lawrence River, at Murray Bay, etc., by Dr. J. W. Dawson, Mr. J. F. Whiteaves, and others, and also on the Grand Bank of Newfoundland.

The researches of the U. S. Fish Commission have added at least five species, of the *Sipho*-group, to the fauna of the New England coast. Two of these (*S. calatus* V. and *S. glyptus* V.) are small, transversely ribbed species, and may belong to a special division, or subgeneric group.

Sipho pubescens Verrill, sp. nov.

Neptunea propinqua Verrill, Amer. Journ. Sci., xvi, p. 210, 1878.

Neptunea (Sipho) propinqua Verrill, Amer. Journ. Sci., xx, p. 391, Nov. 1880; Verrill, Proc. U. S. Nat. Mus., iii, p. 370, 1880 (*non* Alder, Jeffreys, etc.)

PLATE XLIII, FIGURE 6; PLATE LVII, FIGURE 25.

Shell rather short, fusiform, regularly tapered, obtuse at the tip of the spire, with the suture deep and canaliculate. Whorls about seven, broadly rounded and somewhat flattened, narrowly but distinctly channeled at the suture. Sculpture, over the whole surface, regular and numerous, shallow, spiral grooves or sulci, separated by slightly raised, flat, or somewhat rounded cinguli, usually, but not constantly, wider than the sulci; on the penultimate whorl there are about 14 to 16 of the sulci; slight, but distinct, curved lines of growth cover the surface. Aperture narrow, ovate-elliptical; outer lip broadly and regularly rounded, the edge receding in the middle in a broad, concave curve; at the base of the canal the lip is decidedly

* For this species I established the subgeneric group, *Neptonella*, in 1873, and afterwards (1879) changed the name to *Siphonella*, the former having previously been used by Gray and by Meek. The principal reason for this separation was the character of the odontophore (pl. 57, fig. 21), contrasted with that of *S. Bernicensis*, taken as the type of *Sipho*. It cannot well be separated, even as a subgenus, from *S. Islandicus* and *S. gracilis*, by the dentition alone, according to the figures of these, given by G. O. Sars. The subgeneric group, *Siphonorbis* Mörch, based on the character of the nucleus, may be identical with *Siphonella*. The latter name also appears to have been preoccupied, and must be dropped.

incurved. Canal moderately long, somewhat contracted, spirally curved to the left and strongly bent backward at the tip. Columella very much bent, with a strong sigmoid curvature; the portion opposite the middle of the aperture greatly receding. Epidermis thin, but firm, yellowish green to olive-green, when fresh and uninjured covered with fine, short capillary processes, forming spiral lines along the cinguli.

The nucleus is moderately large (diameter 2.15^{mm}), somewhat mammillary; its first whorl is strongly turned up obliquely and incurved, smooth. The median tooth of the radula is broad, with three denticles, the middle one largest; the lateral teeth are large, with three sharp, curved denticles, the outer one much the largest, the middle one smallest; occasionally the inner one bears a small secondary denticle on its outer edge.

Operculum long, ear-shaped, with the nucleus at the tip of the small end, which is but little incurved; inner edge strongly convex, beyond the middle; outer edge broadly rounded; color, dark yellowish green. The verge is moderately large, sigmoid, flattened, tapering to an obtuse point, with a small conical papilla near the tip, on the dorsal side.

Color of the shell white; inside of aperture translucent bluish white.

A female of the ordinary adult size and form is 65^{mm} long; breadth 28^{mm} ; length of canal and body-whorl, 46^{mm} ; breadth of body-whorl, 25^{mm} ; length of aperture, 35^{mm} ; its breadth, 14^{mm} ; breadth of opening of canal, at base, 5^{mm} .

An average male is 56^{mm} long; breadth, 26^{mm} ; length of body-whorl, 40^{mm} ; its breadth, 17^{mm} ; length of aperture, 31^{mm} ; its breadth, 12^{mm} . A specimen more slender than usual, is 55^{mm} long; breadth, 22^{mm} ; length of aperture, 30^{mm} ; its breadth, 10^{mm} .

On the American coast, this species was first dredged by us in 1877, on the United States Fish Com. steamer "Speedwell," off Cape Sable, N. S., in 88 to 91 fathoms, fine compact sand, where it occurred in considerable numbers, living; and off Halifax, 42 fathoms, dead.

Off Martha's Vineyard this species is very common, in deep water; it occurred, at 48 stations in that region, in 1880 and 1881. Living specimens were taken, in 86 to 410 fathoms, but it is most abundant between 200 and 410 fathoms; at station 998, in 302 fathoms, 154 specimens were taken, 140 of them living. Dead shells, inhabited by *Eupogonius*, occurred in 64 to 85 fathoms, and also in 458 fathoms. It was taken by Lieut. Z. L. Tanner, on the "Fish Hawk," in 1880, off

Chesapeake Bay, in 56 to 300 fathoms; at station 898, in 300 fathoms, 165 specimens were taken, 115 of them living. Off Delaware Bay, in 156 and 435 fathoms, in 1881.

This shell is closely allied to *S. propinquus* (Alder) of Europe, to which I formerly referred it, with doubt. It agrees very well with that species in form and sculpture; in the canaliculate suture; and in the character of the epidermis, except that our shell seems to be constantly and more decidedly hairy. Our species is, however, a larger and more robust shell, and its nuclear whorls are totally different, for according to Jeffrey's description and figure, *S. propinquus* always has a regularly spiral nucleus, with the first whorl minute and not turned up; this is, also, the case with an authentic specimen, in my possession, received from the Rev. A. M. Norman.

S. turgidulus (Jeff.) Friele is also closely related to our species, in form, sculpture, epidermis, and in having a similar nucleus (as figured by Friele), but it has a shorter canal, and the form of the operculum and character of the dentition are very different.

Sipho Sabinii (Gray).

Buccinum Sabinii Gray. Supplement to Appendix of Capt. Parry's first Voyage, p. cexl, 1824.

? *Fusus Sabinii* Friele. Prelim. Report on Moll. Norwegian N. Atlantic Exp., 1876, Nyt. Mag. Naturvid., xxiii, [auth. cop. p. 7] pl., fig. 15, 15a (teeth and operculum), 1877, (*non* Hancock, *nec* Jeffreys).

Sipho Sabinii Leche. Öfversigt Svenska Exp., Hafs-Mollusker, Kongl. Svenska Vetenskaps-Akad. Handl., xvi, [auth. ed., p. 69] pl. 1, fig. 23a (shell) 23c, d (dentition), 1878.

PLATE LVII, FIGURE 23.

I refer to this species, with some doubt, a small species of *Sipho*, of which I have only two young specimens, taken on Cashe's Ledge, off the coast of Maine, by Dr. A. S. Packard and party, on the "Bache," while dredging there for the U. S. Fish Com., in 1873.

This shell is evidently distinct from all the other species found on our coast, but the absence of the operculum and soft parts, as well as the immature state of the shell, makes the identification somewhat uncertain, but it agrees well with Gray's original description, so far as that goes.* It also corresponds nearly with the figures given by Leche, except that it is younger than the shell figured by him.

The whorls are well-rounded; suture somewhat impressed; numerous (about 12 on the fourth whorl), fine, raised cinguli cover all the surface; these are separated only by narrow incised lines on the early whorls, but on the fifth the intervals are wider than the cinguli; the

intervals are crossed by very numerous epidermal lines of growth, in the form of thin, raised, very fine lamellæ, more or less fringed. The canal is a little recurved and narrow; columella somewhat sigmoid. Nucleus is very small and regularly spiral; spiral lines begin on the first whorl, and the normal sculpture on the second. Length of a specimen with five whorls, 10.5^{mm}; breadth, 5.5^{mm}; length of body-whorl, 8^{mm}.

Sipho parvus Verrill and Smith, sp. nov.

PLATE LVII, FIGURES 20, 20a, 20b.

Shell small, thin, delicate, translucent, subfusiform; with a rather slender, acute spire; a short, straight canal; and few raised, strong, revolving cinguli; suture impressed.

Whorls six to seven, convex, usually with three (rarely five or six) prominent, rounded cinguli, or carinæ, separated by much wider, broadly concave interspaces; the uppermost one is usually some distance below the suture, and is often stronger than the rest, producing a slight shoulder; on the last whorl, in specimens with six whorls, there are about seven to nine principal carinæ, occasionally with a smaller one interpolated, and becoming more crowded anteriorly; on one with seven whorls, there are thirteen principal cinguli; fine, delicate and close, raised lines of growth, or lamellæ, cover the interspaces and cross the raised cinguli. The nucleus is very small, smooth and glossy; the first turn is minute and regularly spiral, not upturned; three spiral cinguli appear on the second whorl. Aperture elliptical; outer lip thin, rounded, incurved at the base of the canal, which is narrow, but very short, and straight; columella nearly straight in the middle. The epidermis is thin, lamellose, but not ciliated.

Color yellowish or grayish white. Operculum ovate, with the outer or left end rounded and incurved, forming a small lobe, defined by a notch, and with the nucleus central to this small lobe.

*Gray's description of *Buccinum Sabini* is as follows:

"Canal short, open, bent to the left."

"Testa oblonga, ventricosa, alba; anfractibus quinque, convexis, longitudinaliter costatis; apertura ovata; canali brevi."

"Shell oblong; ventricose, white; whorls five, convex, slightly longitudinally rib-striated, finely transversely wrinkled; epidermis thin, pale; aperture ovate, half the length of the shell, ending in a short open canal; columella smooth, outer lip thin, inside slightly crenated; axis, three-fourths of an inch, diameter three-eighths. It differs from *Buccinum corneum* (*Murex corneus* Lin.), by not being so long and slender, and the whorls more convex; the aperture ovate instead of roundish-ovate. The specimen brought home appears to be young."

The odontophore (fig. 20a) is very slender; the outlines of the median plates are indistinct; they bear three very small but distinct and nearly equal denticles; the lateral teeth have only two denticles.

Length of an ordinary sized specimen, 11^{mm}; breadth, 5^{mm}; length of body-whorl, 7.10^{mm}; length of aperture, 5^{mm}; its breadth, 2.15^{mm}. The largest specimen (with seven whorls) is 14^{mm} long; breadth, 6.5^{mm}; length of aperture, 7^{mm}; its breadth, 3^{mm}.

Off Martha's Vineyard, in 312 to 506 fathoms (stations 937, 947, 994, 997, 1029), 1881, fourteen specimens.

This delicate species is liable to be confounded with the young of *S. pygmaeus*, but it differs decidedly in its dentition, operculum, nuclear whorls, short and straight canal, and in the character of its spiral cinguli. The upper whorls of *S. pygmaeus* are much more angular, with coarser, and more prominent carinae or cinguli, which are separated by narrower, incised grooves.*

This species, by its spiral nucleus, would be referable to the group, *Siphonorbis*, and it also approaches *Mohnia* Friele, in the character of its dentition and operculum.

Sipho glyptus Verrill, sp. nov.

Tritonofusus latericeus Verrill, Amer. Journ. Sci., xx, p. 391, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 369, 1880 (*non* Möll., Mörch).

PLATE LVII, FIGURE 22; PLATE LVIII, FIGURES 1, 1a.

Shell long-fusiform, with a high, tapering, acute spire; with an impressed, oblique, undulated suture, with convex, transversely ribbed, and spirally grooved whorls; and with a narrow, rather long, nearly straight canal.

Whorls seven to eight, evenly rounded, crossed by about 13 slightly curved, regular, rounded, and prominent ribs, separated by rather wider, regularly concave interspaces; the ribs are lower and a little excurved just below the suture, and fade out before reaching the base

* There are two varieties of *S. pygmaeus* on our coast, which are often well-marked. The more northern and larger form has well-rounded whorls, covered with strong cinguli and sulci, and with a strongly ciliated epidermis; canal long and much curved. The other variety, which abounds off Martha's Vineyard, etc., in from 20 to 350 fathoms, on muddy bottoms, has the whorls flattened and much smoother; the cinguli often obsolete, in part, except on the upper whorls, and the epidermis is darker green or olive, and only slightly ciliated, more often nearly or quite smooth, and the canal is, perhaps, a little shorter and less curved. This may take the variety name, *S. pygmaeus*, var. *planulus*. The nucleus and apical whorls agree well, however, in the two forms.

of the canal; sometimes they are mostly obsolete on the body-whorl. The raised, spiral cinguli are numerous, regular and close, crossing equally the ribs and interspaces; they are mostly alternately larger and smaller, and are separated by narrow, impressed grooves; the cinguli are crossed by very fine, close, and delicate, raised lines of growth, giving them a minutely wavy appearance. Aperture narrow-elliptical; outer lip evenly convex, incurved at the base of the canal, which is narrow and elongated and but slightly bent to the left, and a very little bent back at the tip; columella slightly sigmoid.

The nucleus (fig. 1a) is small, consisting of two whorls; the first whorl is minute and turned obliquely upward and inward, with a smooth, glossy surface, crossed by a few small, transverse grooves; the next whorl is regular, smooth at first, then with fine spiral lines; the normal sculpture begins on the third whorl. Color of shell, grayish white. No obvious epidermis. The largest specimen is 30^{mm} long; breadth, 10.5^{mm}; length of body-whorl, 19^{mm}; its breadth, 9^{mm}; length of aperture, 15^{mm}; its breadth, 4.5^{mm}.

The median teeth of the radula have three small denticles; the lateral ones have only two denticles.

This species was dredged off Martha's Vineyard, by the U. S. Fish Com. steamer "Fish Hawk," in 1880 and 1881 (stations 894, 895, 925, 938, 951, 1028, 1029, 1032), in 219 to 458 fathoms.

This shell has a sculpture much like that of *S. cælatus*, but it has a longer and more acute spire, a longer canal, narrower aperture, and a different nucleus.

In general appearance it resembles *S. latericeus* Mörch, but it is a more delicately sculptured shell, with a different nucleus. It also somewhat resembles *S. pulchellus* (Hancock), in general appearance, but the latter has a much shorter and wider canal, and by Friele is considered identical with *S. latericeus*.

Sipho cælatus Verrill and Smith.

Neptunea (Sipho) cælata Verrill and Smith, in Verrill, Proc. U. S. Nat. Mus., iii, p. 369, 1880.

PLATE LVII, FIGURES 19, 19a.

Off Martha's Vineyard and off Newport, R. I., stations 891 to 895, 238 to 500 fathoms, 1880; stations 947, 994, 997, 998, 1028-1030, in 302 to 458 fathoms, 1881; off Delaware Bay, station 1049, 435 fathoms,—U. S. Fish Com. steamer "Fish Hawk."

The following species, of this family, apparently do not belong to the New England region, but have been found in the Gulf of St. Lawrence, or on the Grand Bank of Newfoundland:

Sipho lividus (Mörch) ?

Fusus (*Sipho*) *lividus* Mörch, Journ. de Conch., x, p. 36, pl. 1, fig. 1, 1862, (*non* Philippi.)

? *Neptunea* (*Sipho*) *terebialis* Gould, Proc. Boston Soc. Nat. Hist., vii, p. 326, 1860; Otia Conch., p. 123.

This species was described from the Banks of Newfoundland. Mörch says that it much resembles *S. Spitzbergensis* Reeve. It may be the species that has been recorded under the latter name, from the Gulf of St. Lawrence, by Whiteaves.*

Mr. J. F. Whiteaves has kindly sent me a specimen of the shell called by him *F. Spitzbergensis*, from the Orphan Bank, Gulf of St. Lawrence, containing the animal. Principal J. W. Dawson has also sent me three specimens of the same shell, from off Metis.

This shell is of moderate size, solid, purplish brown, long-fusiform, with a high, tapering, subacute spire, eight or nine well-rounded whorls, covered with thick, coarse, elevated, rounded or flat, spiral cinguli, separated by deep, square-cut grooves, about as wide; about nine to eleven cinguli on the penultimate whorl. Aperture pyriform. Canal only moderately long, narrow, and nearly straight; columella sigmoid, nearly straight in the middle, not much excavated. Outer lip, in the largest specimens, broadly rounded and with the edge somewhat flaring or expanded in the middle, strongly crenate and ribbed within; inside of aperture pinkish, orange-brown, or bluish

* Mr. Jeffreys (in Ann. and Mag., April, 1876, p. 327) united both the *S. tortuosus* and *S. Spitzbergensis* (Reeve, Belcher's Voy., ii, p. 395, pl. 32, figs. 6a, b, 1855), with *S. togatus* Mörch, 1869, *S. ebur* Mörch, 1869, and *S. Pfeiffii* Mörch, under the name of *Fusus Sabinii* (Gray), and gave the Gulf of St. Lawrence (coll. Whiteaves) as one of its localities. The Gulf shell examined by him was probably the same that I have here described as *S. lividus* †. I cannot believe that this is the shell named *Sabinii* by Gray (see p. 503), nor can I identify it positively with *S. Spitzbergensis*. Jeffreys has given no description of this shell, so far as I know, by which we could judge as to what he thinks its specific characters. In another article (Proc. Zool. Soc., London, xxv, p. 192, 1876) he gives us a different arrangement, for we read, "*Fusus tortuosus*; Reeve, 1855, = *F. Sabinii* (Gray), Hancock, 1846. Not *Buccinum* (*Fusus*) *Sabini*, Gray," and *F. Spitzbergensis* was identified with *Neptunea terebralis* Gould. According to Friele and others there are several very distinct species in this set. *S. ebur*, as determined by Friele, is widely different from our shell, having a short and wide canal, while *S. tortuosus* Reeve is closely allied to *S. pygmaeus*.

white. Nucleus moderately large, not swollen, apical whorl turned up and incurved. Operculum narrow, long-ovate. Length of a shell (♀), 39^{mm}; breadth, 18^{mm}; length of body-whorl, 26^{mm}; length of aperture, 19^{mm}; breadth, 7^{mm}.

The largest example, from Metis, is 57^{mm} long; breadth, 26^{mm}; length of body-whorl, 37^{mm}; breadth, 22^{mm}; length of aperture, 29^{mm}; breadth, 13^{mm}.

In the form of the spire and in the sculpture this species resembles *S. Spitzbergensis*, but in the latter the spiral grooves are fewer and much coarser, as figured by Reeve; the outer lip is more expanded; and the columella and canal are more curved. *S. terebralis* Gould, from the Arctic Ocean, north of Bering's Straits, may be the same as *S. Spitzbergensis*, and in that case the latter name has priority.

Sipho Islandicus (Chemn.) Mörch.

Fusus (*Sipho*) *Islandicus* Mörch (non *Fusus Islandicus* Lovén, nec Gould).

Sipho Islandicus G. O. Sars, Möll. Reg. Arcticæ Norvegiæ, p. 270, pl. 15, fig. 3; pl. x, fig. 19 (dentition); pl. xviii, fig. 55 (operculum).

This has been recorded from the Gulf of St. Lawrence, 212 fathoms, by Whiteaves. Greenland; Iceland; Spitzbergen; Lapland; Norway. Lofoten to Vadso, 50 to 100 fathoms,—Sars. British coast, 30 to 300 fathoms,—Jeffreys. I have seen no genuine examples from America.

From the Grand Bank (Gloucester fisheries, lot 620), I have a single specimen with the canal broken, but with the animal (♀) in alcohol, which resembles the true *S. Islandicus*, but the nucleus seems to have been small and the operculum is different.

The spire is high, with an acute apex, but with the nucleus, which appears to have been small and regular, somewhat eroded and broken. Whorls eight, flattened below the suture, rounded in the middle. Suture shallow, slightly impressed, very narrowly channeled. Sculpture rather coarse, strong, flat, spiral cinguli, separated by impressed grooves, which are narrower than the cinguli on the lower whorls, but of about the same width on the 5th and 6th whorls, on which there are about ten cinguli, becoming obsolete on the sub-sutural band; on the body-whorl the cinguli become broad and flat, separated by narrower, shallow grooves; they are made wavy by the lines of growth. Aperture broad-elliptical; outer lip broadly rounded and somewhat expanded in the middle, with the edge receding or concave; columella-lip regularly arched in the middle, not excavated; columella slightly sigmoid, and rather slender, so far as

preserved, and a little curved forward at base (the end of the canal is broken off). Epidermis greenish yellow, somewhat lamellose along the lines of growth, which are very distinct. Shell bluish white, thin, translucent. Operculum broad ear-shaped, or ovate, with a broadly rounded angle on the middle of the inner edge; small end somewhat incurved, subacute; larger end narrowed, obtuse.

Length, to base of canal, 55^{mm} ; breadth, 27^{mm} ; length of spire, from aperture, 33^{mm} ; breadth of aperture, 13^{mm} .

Sipho latericeus (Möll.) Sars.

Fusus latericeus Möller, Kröyer's Tidss., iv, p. 88, 1842.

Fusus (Tritonofusus) latericeus Mörch, Rink's Grönland, p. 85, 1857.

Sipho latericeus G. O. Sars, Möll. Reg. Arct. Norv., p. 276, pl. 15, fig. 8; pl. x, fig. 24 (dentition).

This species, which inhabits Greenland and the northern coast of Norway and Finmark (20 to 30 fathoms), has been recorded from the Gulf of St. Lawrence by Dr. Dawson and by Whiteaves, but I have seen no American examples.

Bradelle Bank, G. St. Lawr., one living,—Whiteaves. Spitzbergen, 146 to 357 fathoms,—Friele.

Sipho Ossiani (Friele)

Neptunea Ossiani Friele, Catal. Norweg. Nordm. Exp. Spitz., Möll., p. 279, 1879, (by typ. error *Ossiana*.)

A very interesting shell, of large size, which appears to belong to this species, was obtained near the Grand Bank, in 180 fathoms, and presented to the U. S. Fish Commission by Capt. McCormick and crew, schooner "Wachusett," of the Gloucester fishing fleet. The outer lip and end of the canal are, unfortunately, badly broken.

Another example, of smaller size, has been sent to me by Principal J. W. Dawson, who dredged it at Murray Bay, in the mouth of the St. Lawrence River.

This shell has a rather long spire, the upper whorls increasing more slowly in size than the lower, so that the upper portion is somewhat cylindrical; the suture is impressed; whorls eight; lower whorls strongly convex, somewhat ventricose; spiral sculpture strong and rather coarse, flat, raised cinguli, often with a slight median groove, separated by square-cut grooves of about the same width on the sixth and seventh whorls, but broader than the cinguli on the body-whorl; on the lower whorls there are twelve or thirteen cinguli. Whole surface covered with strong raised lines of growth, which recede strongly on the convexity of the whorls. Nucleus rather

large, smooth; apical whorl smaller than the next, somewhat obliquely turned up, not inflated nor deformed. Aperture large and broad, irregularly elliptical (outer lip and canal of the larger specimen, broken). The columella-lip is incurved slightly near the posterior end of the aperture and again below the middle, the portion between being somewhat straight, giving that side of the aperture a crooked or thrice-bent outline; its surface is hollowed out, deeper than the spiral grooves. Columella much curved in a spiral direction, in a side-view receding strongly and then bending forward and outward, and becoming prominent and strongly twisted. Canal short, not very wide, twisted, bent forward. The back side of the canal, at base, is peculiarly swollen and gibbous, and curved forward.

The operculum of the Murray Bay shell is irregularly obovate, the small end considerably incurved, with the nucleus at the tip; large end broadly rounded; inner edge with an angle in the middle, where the rounded outline meets the concave outline of the smaller half; outer edge with an obtuse angle beyond the middle; lines of growth, strong; color yellowish brown.

Epidermis yellow, conspicuous, rather rough, rising into coarse lamellæ and scales along the lines of growth, both on the cinguli and in the grooves. Shell ivory-white within, canal tinged with salmon.

Length to base of canal, 70^{mm}; breadth, 36^{mm}; apex to aperture (across seven whorls), 41^{mm}; breadth of seventh whorl, 31^{mm}; breadth of aperture, 17^{mm}; breadth of apical whorl, 2^{mm}. The Murray Bay example is 65^{mm} long; breadth, 28^{mm}; length of body-whorl, 42^{mm}; length of aperture, 31^{mm}; its breadth, 14^{mm}.

This shell somewhat resembles *S. Islandicus*, but it differs in having a smaller and more regular nucleus; in the more ventricose lower whorls, and deeper suture; in the peculiar broad fold and spiral twist of the columella, giving the aperture an irregular outline on that side; and in the wider, short, and forward-bent canal.

This species would belong to the generic group, *Chrysodomus*, as defined by G. O. Sars. Friele has proposed to make it the type of a new genus.

Tritonofusus Krøyeri (Möll.) Mörch.

Fusus Krøyeri Möller, Krøyer's Tidss., iv, p. 88, 1842.

Fusus (Tritonofusus) Krøyeri Mörch, Rink's Grönland, Tillæg, p. 85, 1857; Catal. Möll. Spitzb., p. 15, 1869.

Fusus arcticus Philippi, Abbild., iii, p. 117, pl. 5, fig. 5, (t. Mörch).

Buccinum cretaceum (Reeve) Packard, Canadian Nat., viii, p. 417, pl. 2, fig. 6, 1863;

Mem. Boston Soc., Nat. Hist., i, p. 288, pl. 7, fig. 7, 1867.

Tritonium arcticum Schmidt (t. Leche).

Caribou I. and Square I. Labrador, 7 to 30 fathoms,—Packard. Gulf of St. Lawrence and Grand Bank. Metis! and Murray Bay,—Dawson; Orphan Bank,—Whiteaves. Greenland and Spitzbergen. Fossil in the Post-pliocene of Canada, Labrador, etc.

Tritonofusus syrtensis (Packard) Verrill.

Fusus syrtensis Packard, Mem. Boston Soc. Nat. Hist., i, p. 288, pl. 7, fig. 13, 1867.
Square Island harbor, Labrador, 30 fathoms,—Packard.

Volutopsis Norvegicus (Chemn.) Mörch.

Fusus norvegicus Jeffreys, Brit. Conch., iv, p. 329, v, pl. 85, fig. 3.

Fusus (*Volutopsius*) *norvegicus* Mörch, Rink's Grönland, Tillæg. p. 85, 1857; Catal. Möll. du Spitzberg, p. 16, 1869, (*Volutopsis*).

Fusus Largillierti Pettit, Journ. de Conch., (t. Mörch).

Volutopsis norvegica G. O. Sars, op. ult. cit., p. 268, pl. 15, figs. 1a, 1b, pl. x, figs. 17a, 17b (dentition), pl. xviii, fig. 54 (operculum).

A fine large specimen of this species, from 75 fathoms, on the "Flemish Cap," a bank east of the Grand Bank, was presented to the U. S. Fish Commission, by Wm. Garrett, of Gloucester, Mass. This specimen belongs to the broad, stout variety, with the last whorl very ventricose.

Newfoundland,—Pettit. Gulf of St. Lawrence, Bradelle Bank,—J. F. Whiteaves. Circumpolar. Greenland; Iceland; Spitzbergen; Northern Scandinavia; North Pacific. North of Hebrides, 189 fathoms,—Jeffreys.

This species was the type of the genus *Strombella* Gray, but that name had been preoccupied.

For those who prefer to follow the custom of Jeffreys and others, in using *Fusus* for this entire group, the following synopsis may be found convenient:

Fusus (*Sipho*) *Stimpsonii* (Mörch), p. 499.

Varieties, *kiratulus* (V.) and *brevis* (V.), p. 500.

Fusus (*Sipho*) *ventricosus* (Gray, Gould), p. 500.

Fusus (*Sipho*) *pubescens* (V.), p. 501.

Fusus (*Sipho*) *Islandicus* (Chemn.), p. 508.

Fusus (*Sipho*) *lividus* (Mörch), p. 507.

Fusus (*Sipho*) *latericeus* (Mörch), p. 509.

Fusus (*Siphonorbis*) *pygmaeus* (Gould), pp. 500, 501.

Variety, *planulus* (V.), p. 505.

Fusus (*Siphonorbis*) *parvus* (V. and S.), p. 504.

Fusus (*Siphonorbis*) *Sabinii* (Gray), p. 503.

Fusus (*Siphonorbis*) *glyptus* (V.), p. 505.

Fusus (*Siphonorbis*) *cælatus* (V.), p. 506.

Fusus (Tritonofusus) syrtensis (Packard), p. 511.

Fusus (Tritonofusus) Krøyeri (Möll.), p. 510.

Fusus (Chrysodomus) Ossiani (Friele), p. 509.

Fusus (Neptunea) despectus (Linné), p. 499.

Variety, *tornatus* (Gould), p. 499.

Fusus (Neptunea) decemcostatus (Say), p. 499.

Fusus (Volutopsis) Norvegicus (Chemn.), p. 511.

The genus *Fulgur* (including *Sycotypus* Gill, non Gray) is closely allied to the preceding forms. It includes two common New England species: *F. caricus* and *F. canaliculatus*.

Nassa nigrolabra Verrill.

Nassa nigrolabra Verrill, Proc. U. S. Nat. Mus., iii, p. 371, 1880.

PLATE LVIII, FIGURE 12.

Off Martha's Vineyard, station 870, in 155 fathoms; one specimen. This species was referred to *Nassa*, only provisionally. The animal is not known.

A single fresh, but dead, specimen of a cancellated *Nassa*, resembling *N. incrassata*, of Europe, was dredged by us, off Halifax, in 1877. It may have been a ballast-specimen.

Trophon clathratus, var. *Gunneri* (Lovén).

Tritonium Gunneri Lovén, Index Moll. Lit. Scand. occid. hab., Ofversigt Kongl. vet. Akad. Förh. [p. 12], 1846.

Murex (Trophon) Gunneri Möreh, Faunula Ins. Faeroënsium, Vid. Med. Nat. For., 1867, p. 84.

Trophon Gunneri H. and A. Adams, Genera, i, p. 77, 1858.

Verrill, Amer. Journ. Sci., v, p. 6, 1873.

Trophon clathratus, var. *Gunneri* G. O. Sars, Fauna Reg. Arct. Norvegie, p. 247, pl. 15, figs. 11, a, b.

PLATE XLIII, FIGURE 8.

Le Have Bank, 45 and 60 fathoms, Smith and Harger, on the "Bache," 1872. Off Cape Sable, N. S., 59 fathoms; mouth of Halifax harbor, 16 and 18 fathoms, 1877,—U. S. Fish Com. steamer "Speedwell." Gaspé Bay! (coll. Whiteaves). Metis! both forms, (coll. Dawson).

This is an arctic species, probably circumpolar, found at Greenland, Iceland, Nova Zembla, and the extreme northern parts of Europe. Finmark,—Lovén, Sars; Bergen,—Norman; Kariska Sea, 10 to 20 fathoms,—Leche.

By Jeffreys, G. O. Sars, Leche, and others this shell has been regarded as a mere variety of *T. clathratus* (Linné)=*T. scalariforme* Gould. Among a considerable number of specimens that I have examined from American waters I have seen few intermediate speci-

mens, and therefore prefer to keep them as distinct forms, for the present, but without doubting the observations of the excellent naturalists referred to.

Trophon Fabricii (Möller).

Tritonium craticulatum Fabr., Fauna Grönl., p. 400, 1780 (*non* Linné).

Trophon Fabricii (Beck) Möller, Krøyer's Tidsskr., iv, p. 87, 1812.

Trophon craticulatus G. O. Sars, op. cit., p. 248.

Gulf of St. Lawrence, Orphan Bank,—J. F. Whiteaves. Davis Straits,—Seudder, 1879.

This is a very arctic form, inhabiting Wellington Channel, Greenland, Iceland, Spitzbergen, Finnmark, Bergen. Greenland, 35 to 80 fathoms, Valorous Exp.,—Jeffreys. Fossil in the Post-pliocene beds of England.

The specimen from Davis Straits is 33^{mm} long; breadth, 15^{mm}; length of aperture, 18^{mm}.

Anachis costulata (Cantraine) Verrill.

Fusus costulatus Cantraine (t. Monterosato), (*non* C. B. Adams).

Columbella Haliæti Jeffreys, British Conch., iv, p. 356, 1867; v, p. 219, pl. 88, fig. 3.

Anachis Haliæti Verrill, Amer. Journ. Sci., vii, pp. 405, 412, 503, 1874.

Pyrene costulata G. O. Sars, op. ult. cit., p. 252, pl. 23, fig. 16, pl. x, fig. 2 (dentition).

Anachis costulata Verrill, Amer. Journ. Sci., xx, p. 392, 1880; Proc. Nat. Mus., iii, p. 406, 1881.

PLATE XLIII, FIGURE 7.

Gulf of Maine, at Cashe's Ledge, Jeffrey's Bank, etc., 30 to 114 fathoms,—“Bache,” 1873. South of Halifax, N. S., 95 fathoms, 1877, and off Cape Cod, 67 to 96 fathoms, 1879,—U. S. Fish Com. steamer “Speedwell.” Off Newport, R. I. and south of Martha's Vineyard, 1880 and 1881, common in 116 to 506 fathoms,—steamer “Fish Hawk” (abundant at stations 891, 365 fathoms, and 1038, 116 fathoms). Off Chesapeake Bay, station 898, 300 fathoms. North of Hebrides, 170 to 650 fathoms, off Faroe I., and 25 miles N.N.W. of Unst, 85 to 95 fathoms, —Jeffreys. Lofoten I., 400 fathoms,—Sars. Fossil in the later European Tertiary deposits, Vienna, Messina, etc., —Jeffreys.

Astyris diaphana Verrill, sp. nov.

Astyris rosacea (pars) Verrill, Proc. Nat. Mus., iii, p. 408 (*non* Gould).

PLATE LVIII, FIGURE 2.

Shell thin, delicate, translucent, white, nearly smooth, elongated,

with a long, tapering, acute spire. Whorls eight, broadly and evenly rounded; suture somewhat impressed, but not deep, frequently narrowly channelled. Surface, except anteriorly and on the canal, destitute of spiral lines, and of any indication of ribs, but covered with very close, almost microscopic lines of growth, which give the surface a dull appearance, when dry; on the canal and extending to the anterior part of the body-whorl are a number of distinct spiral lines, becoming faint opposite the middle of the aperture; fine, microscopic, spiral striations sometimes appear on the lower whorls. The nucleus is larger than in *A. rosacea*, rounded, depressed, and spiral, but somewhat mammillary. The aperture is small, oblong-ovate; the outer lip is sharp at the edge, but in adult shells has a distinct thickening a little back from the margin; the inner surface is usually smooth, but in some adult specimens there are four or five small, transversely oblong tubercles, back from the margin, and a larger, conical tubercle at the base of the canal. Columella sigmoid, a little excavated in the middle, and with a distinct, raised, spiral fold at its inner edge, anteriorly; canal short, open, very slightly curved. Epidermis thin, closely adherent, minutely lamellose along the lines of growth, pale greenish gray, or yellowish white.

Length of one of the largest specimens, 12^{mm}; breadth, 4^{mm}; length of body-whorl and canal, 7^{mm}; length of aperture, 5^{mm}; its breadth, 1.8^{mm}. Stouter and shorter examples occur.

Off Martha's Vineyard, in 65 to 487 fathoms, 1880 and 1881,—U. S. Fish Com. Off Chesapeake Bay, 300 fathoms,—Capt. Tanner. Taken at many stations. At 870 and 876, it occurred in considerable numbers.

This species resembles *A. rosacea*, of which I formerly supposed it to be a deep-water variety. A more careful examination of a larger and better series convinces me that they are distinct. The present species is a more slender and elongated, and far more delicate shell, and is destitute of the impressed spiral lines that cover the whorls, both in that species and *A. Holbölli*,* and is without any traces of transverse ribs, on the upper whorls. The fold on the columella-edge

*I regard *A. Holbölli* (Möller) of Greenland, as different from the true *A. rosacea* Gould, of New England. The latter is a stouter shell, with broader aperture, and is not distinctly transversely ribbed, like the former, except on the whorls next to the nucleus. Moreover, the nuclear whorls differ. I have compared Greenland specimens directly with our own. If not a distinct species, it is certainly a very marked variety. The true *A. rosacea* occurs from off Chatham, Cape Cod, 16 fath. to the Gulf of St. Lawrence! Mass. Bay, 15 to 25 fathoms!

and the submarginal thickening of the outer lip are also good distinctive marks, but the great difference in the nucleus is, perhaps, of still greater importance. Fresh specimens, when wet, are so transparent that the internal form of the columella can often be seen, through the shell.

Astyris pura Verrill, sp. nov.

This shell is very abundant in many of our deeper dredgings, on muddy bottoms. It resembles the shallow-water species, *A. zonalis** (= *A. dissimilis* Stimp.), in form, except that it is somewhat shorter and stouter, with the whorls more convex, the columella more excavated, the aperture a little wider and the canal slightly bent back, at tip, but the shell is translucent and glossy, and the color is pure white, or pinkish white, except near the apex, where it is tinged with pale brown or pink, in fresh specimens. The surface is smooth, except slight lines of growth and a few faint spiral lines, on the canal, anteriorly. The nucleus is distinctly larger than in the typical *A. zonalis*. It is probable that this form is a distinct species.

Off Martha's Vineyard, 100 to 487 fathoms, 1880, 1881,—U. S. Fish Com.; off Chesapeake Bay, 300 fathoms,—Capt. Tanner. Abundant, living, at stations 892, 894, in 487 and 365 fathoms.

TÆNIOGLOSSA.

Dolium Bairdii Verrill and Smith.

Dolium Bairdii Verrill and Smith, in Verrill, Amer. Journ. Sci., xxii, p. 296, Oct., 1881 (description).

The apical or nuclear whorls are yellowish brown, smooth, showing only faint lines of growth, and consist of nearly four turns. The color and character of the surface changes abruptly beyond the nucleus, the normal sculpture suddenly appearing. The primary whorl is very small, regularly spiral, a little prominent. On the second whorl below the nucleus there are seven primary darker brown ribs, with seven smaller and paler ones, alternating with them, and some still smaller ones interpolated.

The largest specimen taken (♂) is 68^{mm} long; breadth, 56^{mm}; length of aperture, 53^{mm}.

Off Martha's Vineyard, station 945; 202 fathoms, one large living (♂), stations 1032, 1036, 1038, 1040, 94 fathoms; young specimens and fragments of several large ones.

* The true *A. zonalis* also occurs in this region, from the shore to 100 fathoms. The deep-water ones are highly colored and banded, like those from shallow water.

Off Delaware Bay, station 1046, 104 fathoms, one living (♂), 1881,
—Lieut Z. L. Tanner.

Lunatia nana (Möll.) Sars.

Natica nana Möller, Kröyer's Tidsskr., iv, p. 80, 1842.

Lunatia nana G. O. Sars, op. cit., p. 159, pl. 21, figs. 19 *a, b*; pl. v, fig. 14 (denticulation).

Verrill, Proc. Nat. Mus., ii, p. 197, 1879; iii, p. 371, 1880.

Mamma borealis Mörch, Moll. of Greenland, p. 127, 1857, (*non* Gray).

PLATE XLII, FIGURE 9.

This was taken by Prof. S. I. Smith and myself at Eastport, Me., in 1864; by Prof. H. E. Webster at Seal Cove, Grand Menan, I., in 1872; on Le Have Bank, 45 fathoms, by Messrs. S. I. Smith and O. Harger, of the U. S. Fish Com.; on the "Bache," in 1872; by the Fish Com. party in Casco Bay, 1873; off Cape Ann, 115 fathoms, 1877; Halifax Harbor, and Bedford Basin, 16 to 33 fathoms, 1877; off Cape Cod, on Stellwagen's Bank, 26 to 32 fathoms, 1879; by our parties in 1880 and 1881, south of Martha's Vineyard and Block Island, in 22 to 29 fathoms.

Gulf of St. Lawrence! (coll. J. F. Whiteaves.)

Greenland and northern Norway. *Natica borealis* Gray (Beechey's Voy., Zoology, pl. 37 fig. 2, 1879), confounded with this species by Mörch, is an umbilicated shell, with a high acute spire.

Lunatia levicula Verrill.

Lunatia levicula Verrill, Proc. U. S. Nat. Mus., iii, p. 371, 1880 (description).

The largest specimen taken (station 985) is 10^{mm} long; breadth 37^{mm}; length of body-whorl, 39^{mm}; length of aperture, 33^{mm}; breadth, 19^{mm}.

This shell was first dredged by me, near Eastport, Me., in 1870. It has since been dredged by the United States Fish Commission parties in Casco Bay, Me., 1873; off Block Island, stations 812 to 815, in 26 to 29 fathoms, 1880; off Martha's Vineyard, station 873 to 985, 26 to 100 fathoms, 1880 and 1881. It is still a very rare species.

It has some resemblance to *Acygbia flava*, on account of the lightness and thinness of the shell, and in form, but the shape of the aperture is different, and there is a distinct umbilicus. The columella is also less incurved in the umbilical region.

Although a much thinner and far more delicate shell, this species has considerable resemblance to *L. heros*, externally, but the whorls are more swollen and the suture more impressed, while the lines of growth are more flexuous. The best distinctions are to be found in the nature of the columella margin and consequent form of the aperture, and in the umbilicus. In this species the upper part of the aperture is encroached upon by the swollen body-whorl, and then the columella margin rapidly recedes with a deep sinuous concave bend, above the umbilicus, causing a sudden widening of the shell-aperture at the middle; this incurvature of the columella is very conspicuous in a profile view, looking into the aperture, and renders the interior of the shell visible far within. In *L. heros* no such abrupt curvature of the columella occurs, its outline forming only a slightly flexuous curve. In *L. levicula* there is no thickened callous behind the umbilicus, the margin of the lip being then reflexed and thin. The umbilicus is well-marked and deep but not so large as usual, even in the shallow-water variety of *L. heros*.* Our best specimens of *L. levicula* have a rich, chestnut-brown interior.

In the localities where we have dredged this species we have also taken large egg-capsules, probably belonging to it, coated with sand and shaped like those of *L. heros*, but with the cells very much larger, and so prominent or swollen as to rise above the surface. Egg-capsules of the same kind were dredged on Stellwagen's Bank, in 14 to 42 fathoms, 1879, but we did not take this shell at those localities.

Amaura candida Möller.

Krøyer's Tidsskr., iv, p. 80, 1842.

H. and A. Adams, Genera, i, p. 214, pl. 22, fig. 9.

This Greenlandic species has been recorded from the Gulf of St. Lawrence, by Whiteaves.

Marsenina glabra Verrill.

Oxinoë glabra Couthouy, Boston Journ. Nat. Hist., ii, p. 90, pl. 3, fig. 16, 1838.

Lamellaria perspicua (pars) Gould, Binney's ed., p. 337, fig. 607 (?).

Marsenina micromphala (Mörch) Bergh, op. ult. cit., p. 121, 1857.

G. O. Sars, op. cit., p. 151, pl. 21, figs. 10 a-d.

Marsenina glabra Verrill, Proc. U. S. Nat. Mus., iii, p. 373, 1880.

PLATE XLII, FIGURES 1, 1a, 4.

This species is not uncommon at Eastport, Me., where I collected

* There is a small, deep-water variety of *L. heros*, very common in our dredgings south of Martha's Vineyard, which has the umbilicus larger and more open than in the ordinary form. Intermediate states also occur.

it in 1859, 1861, 1863, 1864, 1868, 1870, and 1872. It was dredged in 1879 by our party, on the U. S. Fish Commission steamer "Speedwell," off Cape Cod, in 34 fathoms. North Greenland,—Bergh.

Marsenina prodita (Lov.) Bergh.

Lamellaria prodita Lovén, 1846.

Marsenina prodita Bergh, Vid. Meddel. Naturh. For., Kjöbenhavn, 1857, p. 112, pl. 1, figs. 1-6, 8-24, (anatomy, etc.)

G. O. Sars, Möll. Reg. Arct. Norvegiæ, p. 151, pl. 12, figs. 5 *a-c*; pl. v, figs. 7 *a*, *b* (dentition).

Verrill, Proc. U. S. Nat. Mus., iii, p. 373, 1880.

PLATE XLII, FIGURES 2, 2*a*.

This species was taken living, at Eastport, Me., by Prof. S. I. Smith and myself, in 1864 and 1868. This is easily recognized by its comparatively prominent, acute spire, turned to one side, by its obliquely elongated aperture, and by the margin of the outer lip being slightly inflexed near the suture.

Marsenina ampla Verrill.

Marsenina ampla Verrill, Proc. U. S. Nat. Mus., iii, p. 374, 1880 (description).

PLATE XLII, FIGURES 3, 3*a*.

Eastport, Me. Dredged in 1868, by the writer.

Lamellaria pellucida Verrill.

Lamellaria pellucida Verrill, Amer. Journ. Sci., xx, pp. 391, 395, Nov., 1880 (description); Proc. U. S. Nat. Mus., iii, p. 372, 1880, (description).

PLATE LVIII, FIGURES 4, 5, 5*a*.

U. S. Fish Commission, stations 870 to 872, south of Martha's Vineyard, in 86 to 155 fathoms, fine sand (16 specimens, living), 1880; stations 940, 949, 1032, 1038, in 100 to 208 fathoms, 1881.

Off Delaware Bay, 130 to 156 fathoms.

Lamellaria pellucida, var. **Gouldii** Verrill, nov.

PLATE LVIII, FIGURE 3.

Closely related to *L. pellucida* V., of the same region. It differs in having the mantle shorter, broader, and higher, of a softer and thicker substance, with more or less numerous, low verrucæ on the dorsal surface; color pale yellow or yellowish white, more or less blotched or specked with brown, flake-white and yellow. The verge is different in form, the lateral papilla being larger and longer, and not so near the end, the portion beyond it forming a spatulate or obovate lobe, round at the end. The shell is very thin, delicate and

transparent, as in *L. pellucida*, but differs in being a little shorter, broader, with the spire lower, the apex less elevated, and the suture less impressed. The last whorl is more ventricose, and the outer lip and aperture are more broadly rounded. In alcohol, a specimen is 18^{mm} long; breadth, 12^{mm}; height, 10^{mm}.

Part of the differences in the soft parts may be due to variations in the amount of contraction. Both forms occur together, and some specimens are intermediate.

Off Martha's Vineyard, stations 925, 937, 938, 939, 946, 1029, in 224 to 458 fathoms. Several specimens of both sexes occurred. Off Chesapeake Bay.

Velutella cryptospira (Middend.).

Velutella cryptospira G. O. Sars, Möll. Reg. Arct. Norv., p. 149, pl. 21, figs. 9 *a-c*.

Verrill, Proc. U. S. Nat. Mus., iii, p. 374, 1880 (description.)

A good living example of this shell was taken by us, on the "Speedwell," in 1877, off Halifax, Nova Scotia, in 57 fathoms (station 82).

Northern Norway,—Sars. North Pacific and Bering's Straits.

Capulus Hungaricus (Linné).

Capulus hungaricus Jeffreys, Brit. Conch., vol. iii, p. 269, pl. 6, fig. 5; vol. v, pl. 59, figs. 6, 6a.

G. O. Sars, Möll. Arc. Norvegiæ, p. 145, pl. v, figs. 2 *a*, 2 *b* (dentition).

Two living specimens were obtained, in 1881, which appear to belong to this species. They are more delicate and have somewhat finer and more regular radiating ribs than the ordinary European form. It had not been recorded before from our coast.

Off Martha's Vineyard, stations 922, 1029, in 69 and 458 fathoms,—U. S. Fish Commission.

On the European side of the Atlantic, this species is found from Iceland to the Mediterranean.

Trichotropis conica Möller.

Trichotropis conica Möller, Krøyer's Tidss., iv, p. 85, 1842.

G. O. Sars, op. cit., p. 163, pl. 13, fig. 3.

Verrill, Proc. U. S. Nat. Mus., iii, p. 374, 1880.

A single dead, but large and characteristic specimen of this very distinct species was taken in the Gulf of Maine, off Cape Sable, Nova Scotia, in 75 fathoms, by the United States Fish Commission party, on the "Speedwell," in 1877. Greenland. Northern Norway.

It is easily recognized by its conical spire, and its flattened base, covered with revolving grooves and ridges. The revolving cinguli on the spire are stronger than those on the base, and unequal.

Torellia fimbriata Verrill and Smith, sp. nov.

PLATE LVII, FIGURES 27, 27a.

Shell thin, fragile, translucent, broader than high, with a short, depressed spire, the apex small and a little prominent, the last whorl large and ventricose, with spiral carinae bearing divergent epidermal hairs.

Whorls five, very convex, rapidly enlarging; suture deep, slightly channelled; nuclear whorls smooth and glossy, regularly spiral, the first whorl minute. Sculpture, several raised, angular, spiral carinae, separated by unequal intervals, on which are finer spiral lines; and numerous, very evident, thin, raised flexuous lines of growth, which cross both the intervals and carinae, rendering the latter finely nodulous. On the last whorl there are about ten carinae; each of which usually supports a spiral row of long epidermal hairs; the uppermost of these is just below the suture, and its epidermal processes are long and appressed against the preceding whorl; the next is separated by a wide space, while those on the convex part of the whorl are nearer together; the last defines the border of the umbilicus, which is deep, but not broad. Aperture large, roundish, the lip continuous in adult shells; in the umbilical region the lip is somewhat reflected, so as to partially conceal the umbilicus; within the lip the columella has a very obtuse lobe, projecting inward.

Epidermis thick, pale yellowish, or greenish yellow, more or less lamellose along the lines of growth, and usually rising into long and large divergent hair-like processes along the spiral carinae. Shell yellowish white.

The median teeth of the radula (fig. 27*c*), have broad, truncated bases, with the lateral angles a little prominent and rounded; the free end is broad-triangular, with slightly concave lateral lines, bearing small sharp denticles, or sometimes merely crenulated; the median denticle is acute and prominent. The large lateral teeth have broad bases, of which the outer edge is oblique, with the anterior corner prominent and rounded; the tip is strongly obliquely curved, and very sharp. The outer lateral teeth are strongly hooked and very acute.

Length of the largest specimen (δ), 14.5^{mm}; breadth, 17^{mm};

length of body-whorl, 13^{mm} ; length of aperture, 10^{mm} ; breadth, $10\cdot2^{\text{mm}}$; length of hairs, $1\text{--}3^{\text{mm}}$.

A variety (var. *tiarella*) occurred in company with the typical form, at station 1026, 182 fathoms, in which the subsutural carina is well-developed, and crowned by its row of long hairs, but the other carinae are nearly obsolete, and only bear rows of short inconspicuous hairs; the epidermis is elsewhere thick and lamellose, not hairy. The spire is a little more elevated.

Off Martha's Vineyard, stations 869, 878, 939, 1025, 1026, 1033, 1038, in 142 to 258 fathoms, 1880 and 1881,—U. S. Fish Com. A small specimen was taken in 1873, at station 213, 52 to 90 fathoms, near Cashe's Ledge, off the coast of Maine, by the party on the "Bache."

Twenty-three specimens, mostly preserved in alcohol, with the animals, are in the collection. They show considerable variation in the prominence of the spiral carinae and in the length of the epidermal hairs on them. They also vary somewhat in the elevation of the spire, but in none is it so elevated as in the figures that Jeffreys and Sars give of *T. vestita*.

Torellia vestita Jeffreys.

Torellia vestita Jeffreys, Brit. Conch., iv, p. 244, pl. 4, fig. 1, 1867.

G. O. Sars, Moll. Reg. Arct. Norvegiæ, p. 162, pl. 22, figs. 1, *a*, *b*, pl. xviii, fig. 14.

Verrill, Amer. Journ. Sci., v, p. 15, 1873 (description).

Smith and Harger, Trans. Conn. Acad., iii, p. 49, 1874 (description).

PLATE XLII, FIGURE 5.

First taken, on our coast, in 1872, Gulf of Maine, 150 fathoms, by the Fish Com. party, on the "Bache." Off Martha's Vineyard, stations 871, 872, 1038, in 86 to 146 fathoms,—U. S. Fish Com.

Shetland,—Jeffreys, Lofoten I., 200 to 300 fathoms; west coast of Norway, 50 to 60 fathoms,—Sars.

The specimens that I refer to this species differ from the preceding in not being spirally carinated, and in having a thinner epidermis, which is covered pretty uniformly with small and short epidermal hairs, which often appear to be arranged in transverse rows, along the lines of growth. The form of the shell and aperture is similar, but the spire appears to be somewhat more elevated in this species, and the last whorl less swollen. The shell is thin and fragile. Possibly a larger series might show that they are only varieties of one species.

Cerithiella Whiteavesii Verrill.*Cerithiopsis costulatus* Whiteaves (*non* Möller).*Lovenella Whiteavesii* Verrill, Amer. Journ. Sci., xx, pp. 391, 396, Nov. 1880; Proc. U. S. Nat. Mus., iii, p. 375, 1880.

PLATE XLII, FIGURE 7.

The generic name, *Lovenella* G. O. Sars, having been preoccupied in Hydroida, I propose to use *Cerithiella* for the same group, with *C. metula* (Lov.) as the type-species. The dentition is peculiar.

Off Martha's Vineyard, stations 891, 892, and 894, in 365 to 500 fathoms, 1880; 917, 994, 997, 999, in 266 to 368 fathoms, 1881,—U. S. Fish Com. Gulf of Saint Lawrence! 200 fathoms, (coll. Whiteaves.)

Lacuna glacialis Möller.*Lacuna glacialis* Möller, Krøyer's Tidsskr., iv, p. 82, 1842.

PLATE XLII, FIGURE 6.

(Gulf of St. Lawrence! (coll. J. F. Whiteaves). Greenland,—Möller.

Fossarus elegans Verrill and Smith, sp. nov.

PLATE LVII, FIGURE 28.

Shell small, ovate, with a short, acute, turreted spire, and five angulated and sharply carinated whorls, elegantly latticed between the carinae. The whorls increase rapidly, the last being relatively large. On the last whorl there is a sharp angular carina at the shoulder, often with a smaller one just below it; a larger and more prominent one around the periphery; and three or four smaller ones on the anterior slope, besides a spiral fold around the umbilical region; on the larger specimens there are sometimes two or three strong, raised varices on the last whorl, and the edge of the lip is thickened. The intervals between the carinae are concave. On the preceding whorls the two larger carinae are visible, often with a small intermediate one. The nucleus is minute, regular, smooth, a little prominent. The rest of the shell is covered, between the carinae, with numerous close, thin, oblique, raised lamellae, or lines of growth; those on the subsutural band are flexuous. Aperture nearly round; lip continuous; outer lip thickened, and with denticles externally, where the carinae terminate. Umbilicus spiral, very narrow, sometimes closed. Color white.

Length, 5.3^{mm}; breadth, 4^{mm}; length of aperture, 2^{mm}.

Off Martha's Vineyard, station 949, 100 fathoms, 1881,—U. S. Fish Com. Eight specimens, none living.

Litiopa bombix Rang.

Litiopa bombix Woodward, Manual Conch., p. 136, pl. 9, fig. 24, 1856.

H. and A. A. Adams, Genera, i, p. 324, pl. 34, fig. 5a, 1858 (*bombyx*).

Chenu, Man. de Conch., i, p. 304, fig. 2150, 1859.

Found attached to floating gulf-weed (*Sargassum*, sp.) at station 1038, off Martha's Vineyard, N. lat. 39° 58'.

The apex of this shell is slender and acute, consisting of about three whorls, which are distinctly decussated, in contrast with the succeeding whorls, which are smooth, or nearly so. The first whorl is very minute and prominent.

Hydrobia? laevis (Dekay) Verrill.

Cingula laevis Dekay, Nat. Hist. N. York, Mollusca, p. 111, pl. 6, fig. 118 (bad), 1843.

Littorinella laevis Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish. Com., i, p. 653, 1874, (auth. cop., p. 359).

This species has not been well studied and its generic position is doubtful. Perhaps it is not even distinct from *H. minuta*. The soft parts and dentition are not known.

According to the original description, the whorls are convex and there is a large umbilicus. The figure is very poor.

New York harbor, Long Island Sound. Littoral.

Rissoa Stimpsoni Smith.

Rissoa Stimpsoni Sanderson Smith, Annals Lyc. Nat. Hist. New York, vii, p. 157, 1860; ix, p. 393, fig. 2, 1870.

This species may not be distinct from the preceding, but I have not seen authentic specimens.

From Wood's Hole, I have a similar elongated species, with six to seven very convex whorls and deep suture. The umbilicus is very small. Color chestnut-brown. I am not certain that it is identical with this.

Cingula harpa Verrill.

Rissoa (Cingula) harpa Verrill, Proc. U. S. Nat. Mus., iii, p. 374, 1880.

PLATE LVIII, FIGURE 6.

Dredged by the U. S. Fish Com., off Massachusetts Bay, 1877, station 34, in 160 fathoms; off Newport, R. I., and Martha's Vineyard, at stations 892 and 894, in 487 and 365 fathoms, 1880; and at 947, in 312 fathoms, 1881.

Cingula turgida ? (Jeff.) Verrill.

Rissoa turgida (Jeffreys), G. O. Sars, Moll. Reg. Arct. Norvegiæ, p. 183, pl. 10, figs. 12 a, b.

Cingula turgida Verrill, Amer. Journ. Sci., xx, p. 391, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 375, 1880.

A very small, white species, with smooth, rounded whorls and distinct umbilicus.

Station 892, in 487 fathoms, 1880.

Cingula globulus (Möll.) Verrill.

Rissoa globulus Möller, Krøyer's Tidsskr., iv, p. 82, 1842.

Cingula globulus Verrill, Amer. Journ. Sci., xvii, p. 312, 1879.

PLATE XLIII, FIGURE 3.

Gulf of St. Lawrence! (coll. Whiteaves.)

Cingula areolata (Stimp.) Verrill.

Turritella areolata Stimpson, Shells of New England, p. 35, 1851.

Cingula areolata Verrill, Amer. Journ. Sci., xvii, p. 311, 1879.

PLATE XLIII, FIGURE 2.

Omitted from Gould's Invertebrata of Massachusetts. Gulf of St. Lawrence, Trinity Bay, 96 fathoms! (coll. Whiteaves.) Mt. Desert, Me., 10 to 15 fathoms.

Off Martha's Vineyard, station 940, in 130 fathoms, 1881, (one young example).

This species belongs to the group, *Alemania*, but for those writers who do not recognize the subdivisions of *Rissoa*, as of generic value, this will stand as *Rissoa areolata*.

Cingula Jan-Mayeni (Friele) Verrill.

Rissoa Jan-Mayeni Friele, Nyt. Mag. Naturv., 1877 (auth. cop., p. 4), fig. 4.

Cingula Jan-Mayeni Verrill, Amer. Journ. Sci., xvii, p. 311, Apr., 1879; Amer. Journ. Sci., xx, p. 391, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 375, 1880.

PLATE XLII, FIGURE 8.

First taken on the New England coast in 1880, at stations 891 to 895, in 238 to 500 fathoms; a single specimen occurred at station 880, 252 fathoms. In 1881 it was taken at several stations in 255 to 410 fathoms. Whiteaves had previously dredged it in the Gulf of Saint Lawrence, 200 fathoms!

This species belongs to the subgeneric group, *Alemania*, as defined by G. O. Sars.

Cingula castanea (Möll.) Verrill, Sars.

Rissoa castanea Möller, Kröyer's Tidsskr., iv, p. 82, 1842.

Cingula castanea G. O. Sars, Moll. Reg. Arct. Norvegiæ, p. 174, pl. 10, figs. 1, *a*, *b*, 1878.

Verrill, Amer. Journ. Sci., xvii, p. 312, 1879.

PLATE XLIII, FIGURE 1.

Eastport, Me., 1864! Mt. Desert, Me., 1861! Gulf of St. Lawrence!
(coll. Whiteaves). Greenland,—Möller. Norway,—Sars.

Assiminea Grayana Leach.

Assiminea Grayana Jeffreys, British Conch., v, p. 99, pl. 4, fig. 1; pl. 97, fig. 5.

Verrill, Amer. Journ. Sci., xx, p. 250, Sept., 1880; Proc. U. S. Nat. Mus., iii, p. 379, 1880.

PLATE LVIII, FIGURE 7.

This was found in July, 1880, by the writer, living among decaying sea-weeds, at high-water mark, between the docks at Newport, R. I., where it was common, associated with *Truncatella* and *Alexia*. Common in similar localities on the British and other European coasts.

Truncatella truncatula (Drap.) -

Truncatella truncatula Woodward, Man. Conch., p. 137, pl. 9, fig. 25, 1856.

Jeffreys, British Conch., iv, p. 85, pl. 4, fig. 1.

Verrill, Amer. Journ. Sci., xx, p. 250, Sept., 1880; Proc. U. S. Nat. Mus., iii, p. 376, 1880.

PLATE LVIII, FIGURES 8, *8a*, *8b*.

This species was found by the writer, living in considerable numbers, and of all ages, among the docks at Newport, R. I., July, 1880. It occurred among decaying sea-weeds thrown up at high-water mark, both among the vegetable matter and on the under side of stones.

Common on the coasts of Europe in similar localities. Perhaps introduced on this coast by shipping, but it may have been hitherto overlooked. It was associated with *Assiminea Grayana* and *Alexia myosotis*.

Cæcum Cooperi Smith.

Cæcum Cooperi Sanderson Smith, Annals Lye. Nat. Hist., N. York, vii, p. 154, 1869; op. cit., ix, p. 393, fig. 3, 1870 (*non* Carpenter, 1864).

Verrill, Invert. Vineyard Sound, p. 649 [355].

Cæcum costatum Verrill, Amer. Journ. Sci., iii, p. 283, pl. 6, fig. 6, 1872.

Gardiner's Bay, Long Island, and Vineyard Sound, Mass., 4 to 10 fathoms.

The following species should have been inserted on p. 522 :

Cerithiopsis costulata (Möller) Sars.

Turritella ? *costulata* Möller, Krøyer's Tidsskr., iv, p. 83, 1842.

Cerithium arcticum Mörch, Prod. Faunæ Moll. Grœnl., Arctic Manual, p. 127.

Cerithiopsis costulata G. O. Sars, op. cit., p. 189, pl. 13, fig. 7, vii, figs. 5, *a*, *b* (dentition), xviii, fig. 28 (operculum).

A good, living example of this arctic species was dredged by me, in the Bay of Fundy, in 1870.

It may be easily distinguished by the elevated spire, having the whorls crossed by regular and strong, rounded ribs, nearly as in *Scalaria*, with a basal carina, in line with the outer lip, and with revolving lines crossing the furrows between the ribs. The canal is short, but deeply cut, and slightly recurved. The species recorded by Whiteaves as *C. costulata* from the Gulf of St. Lawrence is not this species, but *C. Whiteavesii*.

PTENOGLOSSA.

Scalaria (Cirсотrema) Leeana Verrill, sp. nov.

PLATE LXVII, FIGURE 34.

Shell small, slender, elongated, with well-rounded whorls and deep, oblique suture, (apex broken). Whorls crossed by numerous small, little-elevated, oblique ribs, and on each whorl one large, strong, oblique, varix-like rib, those on the three lower whorls nearly in one line, the last forming the greatly thickened margin of the lip. Both the ribs and the wider intervals between them are crossed by very numerous and fine spiral striae. Aperture small, round-ovate, surrounded by a much thickened, continuous margin close to the edge; this rim around the outer lip is crossed by oblique striae; base with spiral striae, but without a distinct carina; no umbilicus. Size about the same as the preceding species.

Off Martha's Vineyard, station 1038, 146 fathoms, 1881.

Named in honor of Professor L. A. Lee, of Bowdoin College, and of the U. S. Fish Commission party, in 1881.

Scalaria (Opalia) Andrewsii Verrill, sp. nov.

Scalaria, undetermined sp., Verrill, Proc. Nat. Mus., iii, p. 376, 1880.

PLATE LVII, FIGURE 35.

Shell small, slender, elongated, with well-rounded whorls and deep suture. Whorls seven, crossed by about thirteen regular ribs, which are moderately elevated and evenly rounded and, on the lower

whorls, a little thickened, most so in the middle; their interstices are crossed by several distinct spiral cinguli, which also render the ribs a little nodulous; on the penultimate whorl there are about five cinguli; on the last whorl a strong, round, spiral carina surrounds the base or umbilical region, starting from under the upper margin of the outer lip and inclosing a space on which two or more faint spiral grooves can be detected. Aperture round; lips continuous; margin of outer lip thickened by a rib; inner lip with the edge reflected in the umbilical region; no umbilicus. Color white.

Length, 5.5^{mm}; breadth, 2^{mm}; diameter of aperture, 1^{mm}.

Station 873, off Newport, R. I., 100 fathoms, 1880. One specimen.

Named in honor of Mr. E. A. Andrews, an assistant with the U. S. Fish Commission parties, in 1880 and 1881.

Scalaria Dalliana Verrill and Smith.

Scalaria Dalliana Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 391, 395, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 377, 1880.

PLATE LVII, FIGURE 33.

Off Martha's Vineyard, several specimens, from stations 869, 870, 871, 874, and 876, in 85 to 192 fathoms (living ones in 115 to 155 fathoms), 1880; stations 949 and 1038, in 100 to 146 fathoms, 1881.—U. S. Fish Com.

Scalaria Pourtalesii Verrill and Smith.*

Scalaria Pourtalesii Verrill and Smith, in Verrill, Amer. Journ. Sci., pp. 391, 395, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 376, 1880.

PLATE LVII, FIGURE 32.

Operculum black, round-ovate, spiral with nearly three turns, rapidly increasing, lines of growth very oblique; nucleus very excentric.

Off Martha's Vineyard, three fine specimens, one of them living, from stations 871, 873, and 874, in 85 to 115 fathoms; 876, 120 fathoms, fragments, 1880; stations 949, 1038, 100 and 146 fathoms, 1881.—U. S. Fish Com.

*For those malacologists who adopt the ancient generic names of Klein (1756), as was done by Messrs. H. and A. Adams, *Scala* Kl. displacés *Scalaria* Lam. In that case, following the Adamsian nomenclature, the preceding species would be named as follows: *Scala Pourtalesii*; *Scala Dalliana*; *Scala (Opalia) Andrewsii*; *Cirsotrema Leeana*.

Scalaria angulata (Say).

Scalaria clathrus, var. *angulata* Say, Amer. Conch., iii, pl. 27, upper figures, 1831.

Scalaria Humphreysii Kiener, Icon. Coq. Viv., p. 15, pl. 5, fig. 16, 1838-1839.

Scalaria angulata Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, p. 660 (auth. cop., p. 366), 1874.

Scala (*Clathrus*) *angulata* H. and A. Adams, Genera, i, p. 222, 1858.

Stonington, Connecticut, to Florida. Not often found north of Chesapeake Bay. Great Egg Harbor, N. J. ! Stonington.—Linsley. Greenport, Long I.—S. Smith. Common at Beaufort, N. C. !

Acirsa gracilis Verrill.

Acirsa gracilis Verrill, Proc. U. S. Nat. Mus., iii, p. 377, 1880.

PLATE LVII, FIGURE 31.

Stations 873 and 894, in 100 to 365 fathoms, off Martha's Vineyard, U. S. Fish Com.

Aclis striata Verrill.

Aclis striata Verrill, Proc. U. S. Nat. Mus., iii, 377, 1880.

PLATE LVIII, FIGURE 13.

One specimen was dredged by me in the Bay of Fundy, near Eastport, Me., in 1868; another was dredged at station 873, in 100 fathoms, off Newport, R. I., in 1880, by the U. S. Fish Commission.

Aclis Walleri Jeffreys.

G. O. Sars, Moll. Reg. Arct. Norv., p. 196, pl. 11, fig. 18.

Aclis Walleri Verrill, Amer. Journ. Sci., xx, p. 391, Nov., 1880; Verrill, Proc. U. S. Nat. Mus., iii, p. 377, 1880.

PLATE LVII, FIGURE 36.

Three living specimens were taken at stations 892 and 894, in 487 and 365 fathoms, off Martha's Vineyard, 1880.

Aclis tenuis Verrill, sp. nov.

Eulimella ventricosa (pars) Verrill, Proc. Nat. Mus., iii, p. 380, 1880 (*non* Forbes, sp.)

PLATE LVIII, FIGURE 19.

Shell white, glossy, very slender, with a regularly tapered, acute spire. Whorls nine, evenly rounded, nearly smooth, but under the microscope showing slightly raised spiral lines, or obscure angles, on the lower whorls. Suture well-impressed. Aperture ovate-elliptical: outer lip well rounded, a little prolonged, or effuse, at the anterior

end; columella a little curved. Umbilicus a narrow chink. Nucleus small, regular, a little excentric, not prominent and not turned up. Length, 3.8^{mm}; breadth, 1^{mm}.

Off Martha's Vineyard, station 873, 100 fathoms.

Solarium boreale Verrill and Smith.*

Solarium boreale Verrill and Smith, in Verrill, Proc. U. S. Nat. Mus., iii, p. 376, 1880.

PLATE LVII, FIGURES 29, 30.

The largest example has four whorls; the last has a rounded peripheral carina, above which there are about ten low, rounded, unequal cinguli, separated by concave grooves; on the base there are about as many similar but closer cinguli. Breadth, 12^{mm}; height, 7^{mm}; breadth of aperture, 5^{mm}. Two living young specimens from station 871, in 115 fathoms, 1880; a much larger living specimen, from 1038, in 146 fathoms, 1881.—U. S. Fish Commission.

Omalaxis ? *lirata* Verrill, sp. nov.

Shell small, depressed, with a low spire, but showing all the whorls in a side view. Whorls about four and a half, very convex; suture impressed; upper whorls smooth; apical whorl small, regular; last whorl mostly covered with strong, elevated, spiral cinguli, separated by wider concave grooves; around the umbilical region there is a broad, smooth band, with lines of growth only; in the umbilicus are two or three spiral lines. Aperture small, nearly circular, oblique, the inner lip strongly receding or excavated opposite the umbilicus, which is large and circular. Height, 1^{mm}; diameter, 2^{mm}.

Off Newport, R. I., station 770, 8½ fathoms, 1880.

HETEROPODA.

Atalanta Peronii Lesueur.

Atalanta Peronii D'Orbigny, Voy. Amér. Mérid., Moll., p. 171, pl. 12, figs. 1-15; Hist. l'Isle de Cuba, Moll., i, p. 102, 1853.

Verrill, Proc. U. S. Nat. Mus., iii, p. 391, 1880.

Several living examples, probably belonging to this species, were taken at the surface, near George's Bank, latitude 41° 25' north, longitude 65° 5' to 65° 30' west, by Messrs. S. I. Smith and O. Harger, in 1872, on the "Bache." With these were one, or perhaps two, other species of the genus, not yet determined satisfactorily.

Fragments of a *Carinaria*, perhaps *C. Atlantica*, were dredged off Martha's Vineyard, station 865, in 1880.

* Those malacologists who follow H. and A. Adams, in adopting the undefined generic names of Bolton (1798), will use for this shell the name, *Architectonica borealis*.

RHIPHIDOGLOSSA.

Calliostoma Bairdii Verrill and Smith.*

Calliostoma Bairdii Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 391, 396, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 378, 1880.

Dall, Bulletin Mus. Comp. Zool., ix, p. 45, 1880.

PLATE LVII, FIGURE 26.

The animal has long, slender, acute tentacles, yellowish white with a dark central line. Lateral cirri four on each side, two of them anterior and two posterior, similar to the tentacles in color and form, but only about one-half as long, and more slender; a lateral crest-like ridge, with a denticulated margin, connects the cirri together on each side, and runs back on the posterior part of the foot, as a carina; between these there is a shallow groove. Eyes large, black. Foot long, acute posteriorly; in front the angles are obtuse. Color of foot and head white or yellowish, with streaks of dark brown.

South of Martha's Vineyard, at many localities, both in 1880 and 1881. Stations 865 to 874, in 65 to 192 fathoms, 1880, many living specimens; most common at stations 869 and 871, in 192 and 115 fathoms. Stations 921-923, 941, 944, 949, 950, 1036, 1038, 1040, in 65 to 146 fathoms, 1881. Off Chesapeake Bay, station 896, 56 fathoms. Off Delaware Bay, station 1047, in 156 fathoms. Gulf of Mexico and off Florida, "Blake" expedition (t. Dall).

Margarita regalis Verrill and Smith.

Margarita regalis Verrill and Smith, Amer. Journ. Sci., xx, pp. 392, 397, Nov., 1880; Verrill, Proc. U. S. Nat. Mus., iii, p. 378, 1880.

PLATE LVII, FIGURE 37.

Stations 870, 871, 880, 881, 891 to 895, from 115 to 500 fathoms, 1881. Most abundant at stations 891 to 894, 365 to 487 fathoms. Stations 925, 938, 939, 946, 947, 994, 997 to 999, 1028-29, 1032, in 224 to 458 fathoms, 1881. Off Chesapeake Bay, station 898, 300 fathoms. Off Delaware Bay, station 1049, 435 fathoms.

Margarita lamellosa Verrill and Smith.

Margarita lamellosa Verrill and Smith, Amer. Journ. Sci., xx, pp. 391, 397, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 378, 1880.

? *Margarita egleës* Watson, Journ. Linn. Soc., xiv, p. 704, 1879.

Dall, Bulletin Mus. Comp. Zool., ix, p. 40, 1880 [*egleis*].

PLATE LVII, FIGURE 38.

Mr. Dall thinks that this species is only a variety of *M. egleës* W.

* For those authors who do not adopt *Calliostoma*, this species will be *Trochus Bairdii* or *Ziziphinus Bairdii*.

I have myself examined Mr. Dall's series, which show considerable variation, indicating that his view is likely to prove correct. But none of his specimens agree very closely with mine.

Stations 869 and 871, 115 to 192 fathoms; 949, 100 fathoms. Six specimens obtained. Gulf of Mexico, 287 to 2,895 fathoms.—Blake Expedition (t. Dall). Off St. Thomas, W. I., 390 fathoms.—Challenger Expedition (t. Watson).

Machæroplax obscura, var. *bella* (Verkr.).

Margarita bella Verkrutzen, Jahrb. d. Mall. Gesellsch., 1875.

Machæroplax bella Friele, Archiv. for Math. Naturv., 1876, p. 314.

G. O. Sars, op. cit., p. 137, pl. 9, figs. 5 a-c.

Verrill, Proc. U. S. Nat. Mus., iii, 1878 (description).

This appears to be only a highly sculptured variety of *M. obscura*, but it seems to be identical with the form figured by G. O. Sars. It differs from the typical form chiefly in having the base covered with distinct, incised, spiral lines. In some specimens the curved radiating ribs or undulations on the base are well-marked, as in the typical form, in others they are more or less obsolete. The presence of a slight spiral carina, or angle, bordering the umbilicus, is variable in both forms, being, in some specimens, pretty well-marked, in others entirely absent. The sculpture on the upper whorls is also variable in both varieties. The transverse ribs are usually rather more evident in var. *bella*, but they are often equally evident in typical *obscura*, frequently they are almost obsolete, except on the earlier whorls.

The height of the spire varies greatly in both varieties.

Variety *bella* is the predominant form at Eastport, Me., and in the Bay of Fundy, where I dredged it in 1864, 1865, 1868, 1870, in 10 to 40 fathoms. Gulf of Maine, 67 to 86 fathoms, 1874; George's Bank, 43 to 45 fathoms, 1872; off Cape Cod, 1879.—U. S. Fish Com.

Var. *planula*, nov.

Another form of *M. obscura* frequently occurs south of Cape Cod, in 15 to 30 fathoms. In this the base is nearly smooth, with the radiating ribs obsolete, or indicated merely by bands of brownish color, while the spiral lines are entirely wanting, or occur only near the periphery, and often in the umbilicus, which may or may not be defined by an angular border. The body-whorl usually has three or four, more or less distinct, but low, angular, spiral cinguli, of which the first, just below the suture, usually forms only a slight ridge on the flattened subsutural band, and is often entirely absent; the sec-

ond, midway between the suture and periphery, is the largest, most prominent, and most constantly present; below this there may be two or three evident carinæ, or these may be absent, or replaced by several fine, spiral cinguli. Transverse, low ribs or undulations may be more or less distinct on all the whorls, but more frequently are present on the upper whorls, and obsolete, or nearly so, on the lower ones.

These varieties pass into one another by various intermediate forms.

Var. carinata, nov.

This form may prove to be a distinct species. It has the form and the large umbilicus of *M. obscura*, but its strong, spiral carinæ and the distinct spiral carina around the umbilicus cause it to resemble *Margarita cinerea*. The body-whorl has a distinct subsutural carina and three well-separated, strong, raised carinæ below it, the fourth forming a peripheral keel; sometimes smaller intermediate ones occur between the third and fourth, and two or more smaller ones below the periphery; in some examples distinct incised spiral lines cover the whole of the base and inner surface of the umbilicus, while a strongly marked carina, with a deeper groove each side of it, defines the umbilicus. Transverse undulations are usually well-marked on the upper whorls, and sometimes on the base. There are no lamellose lines of growth, so characteristic of *M. cinerea*; and the umbilicus is much larger than in the latter.

Off Martha's Vineyard, stations 997, 1032, 1038, in 146 to 335 fathoms, 1881.

Cyclostrema Dalli Verrill, sp. nov.

Cyclostrema trochoides Verrill, Proc. U. S. Nat. Mus., iii, p. 378, 1880 (*non* Friele, Sars).

PLATE LVII, FIGURE 39.

Shell small, pale, trochiform, with about three and a half whorls, the apical whorl a little prominent, visible in a side-view; whorls rapidly enlarging, well-rounded, the body-whorl ventricose; suture deeply impressed. Aperture nearly circular; lip with a slight angle anteriorly; columella evenly curved. Umbilicus entirely closed, or represented by a very narrow chink. Spiral, incised lines, seven or eight in number, cover the base of the shell and the umbilical depression; shell elsewhere nearly smooth, but covered with very fine striations, or lines of growth, which give the surface a dull appearance, the freshest specimens having only a slight luster. Color yellowish white.

Height, 2^{mm}; breadth, 2.25^{mm}.

A few specimens of this shell were taken in 1880, at station 892, in 487 fathoms.

Cyclostrema rugulosum (Jeff. MSS.) G. O. Sars.

Moll. Reg. Arct. Norvegiæ, p. 129, pl. 21, figs. 1a, 1b.

This is smaller than the preceding species, with a circular umbilicus. The spiral lines around the umbilicus are finer and more numerous.

Station 894, in 365 fathoms, 1880. Finnmark; Lofoten I.; Norway, 80 to 200 fathoms (t. Sars).

Scissurella crispata Fleming.

Off Martha's Vineyard, stations 894-895, in 238-365 fathoms. A single specimen was found by Mr. Dall, in the aperture of a *Margarita*. Gulf of St. Lawrence,—coll. Packard (t. Dawson). On the European coast, from Finnmark to the Mediterranean. Norway, 40 to 400 fathoms,—Sars.

Addisonia paradoxa Dall.

Addisonia paradoxa Dall, Proc. Nat. Mus., iv, p. 405, 1882 (descr., anatomy, dentition, etc.).

Off Martha's Vineyard, stations 923, 940, 950, 69 to 130 fathoms, 1881.—U. S. Fish Commission.

For this curious limpet-like species Mr. Dall has constituted a new genus and a new family, *Addisoniidae*, belonging to the Rhiphidoglossa. The dentition is very peculiar. The shell is white, nearly smooth, with a roundish aperture and a prominent acute, excentric apex, turned obliquely to one side. The shape is something like that of *Crucibulum striatum*.

Cocculina Beanii Dall.

Acmaea rubella? Verrill, Proc. U. S. Nat. Mus., iii, p. 391, 1880 (*non* Fabr., Sars, etc.)

Cocculina Beanii Dall, Proc. Nat. Mus., iv, p. 403, 1882, (dentition, anatomy, etc.)

Off Martha's Vineyard, stations 871, 894, 115 and 365 fathoms, 1880; stations 947, 949, 997, 100 to 335 fathoms, 1881,—U. S. Fish Com. West Indies, 399 to 502½ fathoms, Blake Exp. (t. Dall.)

For this new genus, Mr. Dall has established a new family, *Cocculinidae*, allied to *Fissurellidae*, but with an imperforate and limpet-like shell, and a single asymmetrical gill. It has no lateral cirriform appendages, and probably no eyes.

Cocculina Rathbuni Dall, op. cit., p. 403.

Off Martha's Vineyard, station 937, 506 fathoms. West Indies, 399 and 502½ fathoms, Blake Exp. (t. Dall.)

DOCOGLOSSA.

Lepetella tubicola Verrill and Smith.

Lepetella tubicola Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 391, 396, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 375, 1880.

Dall, Proc. Nat. Mus., iv, p. 408, 1882 (anatomy, dentition, etc.)

PLATE LVIII, FIGURES 29, 29a.

Off Martha's Vineyard, in old tubes of *Hyaliniceia artifex* V. Stations 869, 870, 880, 894, 895, 938, 940, 945, 947, 952, in 130 to 388 fathoms.

Mr. Dall, in the article cited, has constituted for this genus, a new subfamily, *Lepetellinae*, in the family *Lepetidae*. The subfamily is characterized by the presence of eyes, and the peculiar nature of the dentition. Young and perfect specimens of this shell show that the nucleus is subspiral (fig. 29a).

POLYPLACOPHORA.

Leptochiton cancellatus (Sby.) Gray; H. and A. Adams.

Lepidopleurus cancellatus G. O. Sars, Moll. Reg. Arct. Norvegiæ, p. 111, pl. 7, figs. 6a-h.

Leptochiton cancellatus Verrill, Amer. Journ. Sci., xvii, p. 312, 1879.

Off Halifax, 95 fathoms, 1877; Bay of Fundy, 1872, seven specimens; LeHave Bank, station 87 B, 60 fathoms, 1872, "Bache," Cashe's Ledge, 30-40 fathoms, 1874. Gulf of St. Lawrence, 220 fathoms, coll. Whiteaves (t. Dall).

Leptochiton alveolus (Sars) Lovén.

Lepidopleurus alveolus G. O. Sars, op. ult. cit., p. 110, pl. 7, figs. 3, a-i.

Leptochiton alveolus Verrill, Amer. Journ. Sci., xvii, p. 312, 1879.

Gulf of Maine, 150 fathoms, "Bache," 1872.

Hanleyia Hanleyi (Bean) Carp.

Chiton Hanleyi G. O. Sars, op. cit., p. 109, pl. 7, figs. 5, a-i.

Off Cape Ann, Mass., 8½ miles, in 38 fathoms, 1878.

Perhaps only a variety of *H. mendicarius*.

GYMNOGLOSSA.

Stilifer Stimpsonii Verrill.

Stilifer Stimpsonii Verrill, Amer. Journ. Sci., iii, pp. 210, 283, 1872; Verrill, Report, Invert. Anim. of Vineyard Id., in 1st Rep. U. S. Fish Com., pp. 655, 460 (auth. cop., p. 361), 1874. [Stylifer.]

Verrill, in Smith and Harger, Trans. Conn. Acad., iii, p. 49, pl. 1, fig. 1, 1874.

FIGURE 2.

This species was taken in considerable numbers, at stations 814, 823, 824, off Block Island, in 13 to 27 fathoms, 1880. At station 1028, in 410 fathoms, 1881. It occurred, as usual, on the upper surface of *Strongylo-centrotus Dröbachiensis*, between the spines, and partly imbedded in the skin. At these localities the eggs and young occurred with the adults. Some of the eggs were kept alive till they developed into the veliger-stage. The eggs are large, yellow, attached singly or in groups to the skin of the sea-urchin. Its previous localities were off New Jersey, 35 fathoms; George's Bank, 60 fathoms.

FIG. 2.



This shell varies greatly in the proportions of length to breadth. In some, the spire is elevated; in others, comparatively short.

Stilifer curtus Verrill, sp. nov.

Shell short and broad, depressed spheroidal, with the spire very low, rising but little above the body-whorl. Nucleus very small, a little prominent, in our specimen not forming a stiliform tip like that of *S. Stimpsonii* and other species. The rest of the shell has about two whorls, but is formed mainly by the large, ventricose body-whorl, which nearly encloses and conceals the rest. Aperture nearly as long as the shell, lunate, rather large; outer lip very convex, evenly rounded. Shell smooth and white. Height, 2.5^{mm}; breadth, 3.5^{mm}.

Off Martha's Vineyard, station 1028, in 410 fathoms.

Eulima intermedia Cantraine.

Eulima intermedia G. O. Sars, op. cit., p. 210, pl. 11, fig. 20; pl. xviii, fig. 41.

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 379, 1880.

PLATE LVIII, FIGURE 20.

Several living specimens were taken at stations 870, 871, 874, 876,

and 877, in 85 to 155 fathoms, 1880, and at station 949, in 100 fathoms, 1881.

On the European coasts, from Finmark to the Canary Islands and the Mediterranean. Norway, 30 to 300 fathoms,—Sars.

Eulima stenostoma Jeffreys.

Jeffreys, Brit. Conch., iv, p. 207.

G. O. Sars, Moll. Reg. Arct. Norvegiæ, p. 211, pl. 21, fig. 21.

Gulf of St. Lawrence, coll. Whiteaves, (t. Jeffreys.)

Eulima distorta Deshayes.

Eulima distorta G. O. Sars, op. cit., p. 210, pl. 11, fig. 23.

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 379, 1880.

A single living specimen of this curious little shell was obtained at station 871, in 115 fathoms, 1880. On the European coasts, from Lofoten to the Canary Islands and Mediterranean. Norway, 10 to 300 fathoms,—Sars.

Turbonilla Rathbuni Verrill and Smith.

Turbonilla Rathbuni Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 392, 398, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 379, 1880.

PLATE LVIII, FIGURE 15.

Several fine living specimens were taken at stations 865 to 867, 869, 870, in 64 to 192 fathoms, and at stations 894, 895, in 238 to 365 fathoms, 1880; stations 925, 945, 947, 949, in 100 to 312 fathoms, 1881.

Turbonilla Emertoni Verrill.

PLATE LVIII, FIGURES 14, 14a.

Shell small, white, lustrous, elongated, with a very slender, acute spire. Whorls eleven, not very oblique, broadly rounded, a little flattened at the periphery; suture strongly impressed; surface very smooth and glossy, without any spiral lines, but with slight, rather indistinct and irregular longitudinal furrows, which are often absent. Apical whorl small, strongly upturned. Aperture small; outer lip flattened, projecting a little anteriorly (more or less broken in all my specimens). Columella nearly straight, with no trace of a fold.

Length, 4.8^{mm}; breadth, 1.2^{mm}.

Off Martha's Vineyard, station 895, in 238 fathoms, 1880. This

shell resembles *T. nivea* Stimpson, which also occurs in the same region, but the latter is a longer and larger shell with a decidedly smaller and more prominently upturned nucleus, and is strongly and regularly longitudinally ribbed.

Turbonilla Bushiana Verrill.

Turbonilla formosa Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 392, 398, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 380, 1880 (*non* Jeffreys).

PLATE LVIII, FIGURE 16.

Shell lustrous, white, or pinkish white, often beautifully iridescent, elongated, with a regularly tapered, acute spire. Whorls eleven or twelve, somewhat flattened, rounded at the sutures, which are impressed. Numerous, low, broad, rounded, curved ribs cross the whorls; they are most evident just below the sutures, often obsolete above them. Aperture ovate, a little effuse anteriorly. Nucleus small, upturned, reversed. Length, 12^{mm}; breadth, 3.25^{mm}.

A few living examples of this elegant shell occurred at stations 891, 892 and 894, in 365 to 500 fathoms, 1880.

This species is named in honor of Miss K. J. Bush, an excellent assistant in the conchological work of the U. S. Fish Commission.

Turbonilla costulata Verrill.

Turbonilla costulata Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, p. 658, 1874 (auth. cop., p. 364).

Long I. Sound, off New Haven, to Vineyard Sound; 1 to 5 fathoms.

Turbonilla areolata Verrill.

Turbonilla areolata Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, p. 658, 1874 (auth. cop., p. 364).

Long I. Sound, off New Haven, to Vineyard Sound, 2 to 8 fathoms.

Turbonilla stricta Verrill.

Turbonilla stricta Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, p. 659, 1874 (auth. cop., p. 365).

Long I. Sound, near New Haven, Conn., 3 to 8 fathoms.

Turbonilla equalis Verrill.

Turritella æqualis Say, Journ. Acad. Nat. Sci. Philad., v, p. 208, 1826.

Turbonilla equalis Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, p. 659, 1874 (auth. cop., p. 365).

Vineyard Sound, 6 to 8 fathoms. Southern coast.

Turbonilla elegans Verrill.

Turbonilla elegans Verrill, Amer. Journ. Sci., iii, pp. 210, 282, pl. 6, fig. 4, 1872; Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp. 418, 657, pl. 24, fig. 155, 1874 (auth. cop., p. 363).

FIGURE 3.

FIG. 3. The accompanying figure is from a camera-lucida drawing of one of the original specimens, by the writer.



Long I. Sound, off New Haven, 2 to 6 fathoms; Vineyard Sound, 2 to 10 fathoms; Narragansett Bay.

D'Orbigny, in Hist. I. Cuba, Mollusques, 1853, described a shell under the name of *Chemnitzia elegans*. His shell has, however, a well-marked plication on the columella, and, therefore, should undoubtedly be referred to a genus distinct from *Turbonilla*. Otherwise, I would suggest the substitution of *T. elegantula*, for the name of our shell.

Eulimella Smithii Verrill.

Turbonilla Smithii Verrill, Proc. U. S. Nat. Mus., iii, p. 380, 1880.

PLATE LVIII, FIGURE 18.

This species belongs to *Eulimella*, rather than to *Turbonilla*, if these two groups be kept as distinct genera.

Stations 871, 873, 874 and 876, in 85 to 120 fathoms, 1880; 949 and 1038, in 100 to 146 fathoms, 1881.

Eulimella polita Verrill.

Aclis polita Verrill, Amer. Journ. Sci., iii, pp. 210, 282, pl. 6, fig. 5, 1872.

FIGURE 4.

Whorls twelve, besides the nucleus, well-rounded, smooth and glossy, mostly without sculpture, but on some of the upper whorls faint, very slightly elevated, transverse ribs can be detected, with a lens; lines of growth very slight. Suture well-impressed, little oblique. Aperture short-ovate; the outer lip is broadly rounded, slightly effuse in front; the columella is smooth, a little excurved, bending to the left, from its junction with the body-whorl, and then joining the outer lip in a regular curve; in the umbilical region its edge is raised and very slightly reflexed. No umbilicus.



Length, 8^{mm}; breadth, 2^{mm}.

Eastport, Me., 20 fathoms, 1864,—A. E. Verrill and S. I. Smith.

The above description is from the original type. No

other good specimen has yet been found. The nucleus is broken, but it appears to have been upturned.

The figure is from a camera-lucida drawing of the original specimen.

This species appears to be closely allied to *E. ventricosa*, of Europe.

Menestho sulcata Verrill.

Odostomia (Menestho) sulcata Verrill, Proc. U. S. Nat. Mus., iii, p. 380, 1880.

Stations 871 and 894, in 115 and 365 fathoms.

This species differs from *M. sulcata* (= *Plasidnella sulcata* Mighels, 1841) in having finer and more numerous sulci.

The apical whorl, in our specimens, is conspicuously turned up and reversed.

Menestho Bruneri Verrill, sp. nov.

Shell small, white, with an elongated, acute-conical spire, the apical whorl very small, upturned, and incurved. Whorls six, with a rounded shoulder close to the suture, the portion next the suture rising abruptly, nearly at a right angle; periphery flattened, or very slightly rounded; suture little oblique, impressed, or subcanaliculate. Aperture narrowly contracted posteriorly, narrow-ovate anteriorly; outer lip little convex, slightly produced anteriorly; columella ex-curved, flattened, with no fold nor tooth. Sculpture delicate, incised, spiral grooves, separated by wider intervals, and covering the anterior two-thirds of the body-whorl, extending a little back of the aperture, but mostly absent on the preceding whorls. No umbilicus. Length, 5^{mm}; breadth, 2.5^{mm}; length of body-whorl, 3.5^{mm}; of aperture, 2.5^{mm}; its breadth, 1^{mm}.

Off Newport, R. I., station 892, in 487 fathoms, 1880.

I have named this species in honor of Mr. H. L. Bruner, an assistant in the conchological work of the Fish Commission during the season of 1881.

Several additional species of this family, were taken, which I have not yet been able to determine. Among these is the following:

Odostomia (?), sp. A rather large, slender, elongated shell, with smooth, flattened whorls, and a strongly marked, elevated fold on the columella. The specimen is too much broken for description. Station 894, in 365 fathoms.

TECTIBRANCHIATA.

Actæon nitidus Verrill, sp. nov.

PLATE LVIII, FIGURE 21.

Auriculina insculpta Verrill, Proc. Nat. Mus., iii, p. 381, 1880, (*non* Mont. sp.)

Shell small, white, translucent, glossy, elongated, apex obtuse. Nuclear whorl rather large, regular. Whorls six, flattened at the periphery, gradually increasing, slightly roundly shouldered, sculpture delicate, wavy, incised spiral lines, more distant and distinct on the anterior part of the body-whorl, becoming finer, closer, and more wavy behind the middle, obsolete near the suture, except one fine, subsutural groove; suture impressed, or slightly canaliculate. Aperture narrow-ovate, much contracted posteriorly, a little produced anteriorly; columella spirally twisted, the inner edge forming a slightly raised fold.

Length, 8^{mm}; breadth 3^{mm}; length of body-whorl, 5.5^{mm}; length of aperture, 3.5^{mm}; its breadth, 1.8^{mm}.

Stations 892 and 947, in 487 and 312 fathoms, 1880 and 1881, south of Martha's Vineyard.

The shell formerly recorded as *Auriculina insculpta* was a young dead specimen of this species.

Ringicula nitida Verrill.*Ringicula nitida* Verrill, Amer. Journ. Sci., III, vol. v, p. 16, 1872-3; Verrill, in

Smith and Harger, Trans. Conn. Acad., iii, p. 48, pl. 1, fig. 2, 1874.

Dall, Bulletin Mus. Comp. Zool., ix, p. 97, 1881.

Gulf of Maine, 110 fathoms, "Bache," 1872.

Dredged at ten stations, off Martha's Vineyard, in 1880 and 1881, in 100 to 500 fathoms; stations 947, 949, 994, 997, in 100 to 368 fathoms, 1881.

Off Florida, 447 fathoms; Gulf of Mexico and Yucatan Straits, 339 to 640 fathoms (t. Dall).

Mr. Dall records specimens 7.5^{mm} long, 5^{mm} broad, which is larger than any of ours, which seldom exceed 5^{mm} in length.

CHORISTIDÆ, fam. nov.

The peculiar structure of the following shell, its animal, and the radula will not allow it to be placed in any established family. Therefore I propose to make it the type of a new family, *Choristidæ*.

This family may be characterized by the heliciform shell, with the peristotaca continuous between the whorls; lip continuous; columella

without a fold; operculum paucispiral. Animal, with frontal tentacles united by a fold, and with simple posterior tentacles. Head thick and short, with large retractile pharynx. Jaws well developed. Radula with three rows of rhachidian teeth; broad, bilobed, inner lateral teeth; and two rows of small, hook-shaped, outer lateral ones.

Gill large, attached to the inner surface of the mantle on the left side of the neck, and extending over to the right side, consisting of numerous lamellæ.

Choristes elegans Carp., variety **tenera** V.

Choristes elegans Carpenter, Canadian Nat., vi, p. 392, pl. 7, fig. 13, 1872.

PLATE LVIII, FIGURES 27, 27a.

Shell thin, fragile, heliciform, with a low spire and a very large, ventricose body-whorl. Whorls, in our largest examples, four to five, very convex and evenly rounded; apical whorl small, spiral, obliquely upturned and incurved, but not prominent; suture deeply impressed; surface smooth. (The epidermis is mostly destroyed and the surface of the shell eroded in all our living specimens.) The whorls are largely in contact and united well together, though the periostraca is continuous between them. Aperture large, forming more than a half-circle; the outer side is well rounded, the columella-margin nearly straight; lip sharp, continuous all around, raised up and with the edge slightly everted in the umbilical region, so as to partially conceal the umbilicus, which is rather large and deep, nearly circular within. Operculum thin, horny, pale yellow, round-ovate, spiral, with two to three rapidly enlarging whorls, the nucleus ex-centric.

The animals of several alcoholic specimens were examined. Head large, short, thick, rounded or truncate, with two short, flat, obtuse, anterior tentacles, wide apart, but connected together by a transverse fold; posterior tentacles, short, thick, conical, smooth; no eyes visible; proboscis short, thick, retractile; jaws crescent-shaped, strong, black. Verge situated just below the right posterior tentacle, small, papilliform, swollen at base; below this and farther back, a larger and thicker papilla with basal swelling; on each side, between the mantle and foot, at about midlength of the foot, a small mammiform papilla; and two small flat cirri, behind and beneath the operculum. Foot broad, ovate, with two tentacle-like processes in front. Gill large, consisting of numerous thin lamellæ, attached to the inner sur-

face of the mantle, over the left side of the neck, and extending obliquely across and over the neck to the right side.

The largest specimens are badly broken; some of them were about 10^{mm} in length; greatest diameter of operculum, 6^{mm}; breadth 4.5^{mm}. A perfect but small specimen is 6^{mm} long; breadth, 6^{mm}; length of body-whorl, 5.2^{mm}; length of aperture, 4^{mm}; its breadth, 3.2^{mm}.

Station 1031, off Martha's Vineyard, in 255 fathoms, 1881. About a dozen specimens, all living, were taken from the interior of an old egg-case of a skate (*Raja*, sp.). Most of them were badly broken.

I have compared these specimens directly with original specimens of the fossil *Choristes elegans*, found in the post-pliocene of Canada by Principal J. W. Dawson, who very kindly sent me specimens, both adult and young, for examination. I have figured a young fossil specimen for convenient comparison (pl. LVIII, fig. 28.)

Our specimens agree very closely with the smaller fossil ones, in form and structure. The principal difference is in the much thinner and more fragile texture of the recent shells. This may be due to mere local conditions. Therefore, until more specimens of the recent shell are obtained, I prefer to consider it a thin and delicate variety of the ancient type.

Cylichna Dalli Verrill, sp. nov. (Genus provisional).

Shell elongated, white, translucent, somewhat barrel-shaped, a little broader medially, but nearer the anterior end; considerably narrowed posteriorly, with a small pit at the apex. No umbilicus. Aperture as long as the shell, very much narrowed posteriorly, and ending in a narrow slit in the sutural line; anteriorly it increases gradually about to the anterior third, when it suddenly expands into an ovate anterior portion, by the strong excurvature of the columella-margin, and a slight expansion of the outer lip. The outer lip rises, posteriorly, slightly above the level of the body-whorl, in the form of a thin edge, separated from the body-whorl by a narrow, deep fissure; passing backward it forms a gently sloping shoulder, and is very slightly convex and divergent to the anterior end, where it is cut away for the entire width of the shell, and joins the columella-lip in a regular curve, with a sharp edge, not reflexed; the columella-margin is strongly excavated and sinuous, and in the larger specimen has a slight fold, anteriorly; a thin, white callus covers the inner lip. The body-whorl is broadly convex, rounded off gently anteriorly, and more abruptly posteriorly. The pit, at the apex, is well defined, showing some of the volutions, but is injured in both of my

specimens. Whole surface covered with fine, close, minutely wavy spiral lines, scarcely visible without a lens. Animal unknown.

Length of the largest, 10^{mm} ; breadth in the middle, 5.25^{mm} . Stations 997 and 999, in 335 and 266 fathoms, 1881.

Diaphana gemma Verrill.

Diaphana gemma Verrill, Amer. Journ. Sci., xx, pp. 392, 399, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 382, 1880.

PLATE LVIII, FIGURE 22.

Stations 871 and 873, 100 to 115 fathoms, fine sand, south of Martha's Vineyard and Newport, R. I.

Diaphana conulus (Desh.).

Utriculus conulus G. O. Sars, op. cit., p. 287, pl. 17, figs. 17 a-c.

Diaphana conulus Verrill, Proc. U. S. Nat. Mus., iii, p. 382, 1880.

PLATE LVIII, FIGURE 25.

A perfect living specimen of this species was taken at station 870, in 155 fathoms, and a dead one at 949, in 100 fathoms. It had not been found before on the American coast. Our specimen differs somewhat from the figures of the European shell, especially in being stouter, and broader anteriorly.

Diaphana nitidula (Lovén) Verrill.

Cylichna nitidula Lovén, op. cit., p. 142, 1846.

Utriculus nitidulus G. O. Sars, op. cit., p. 286, pl. 17, fig. 13, pl. 26, fig. 3, pl. xi, figs. 6 a, 6 b (gizzard, &c.).

Diaphana nitidula Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 381, 1880.

This shell has been dredged by us in several localities, in deep water off the coast of New England and Nova Scotia, and by Mr. Whiteaves in the Gulf of Saint Lawrence. It was taken at stations 891, 892, and 894, in 365 to 500 fathoms, off Martha's Vineyard.

Amphisphyra globosa Lovén, 1846.

Diaphana globosa G. O. Sars, op. cit., p. 290, pl. 18, figs. 3 c, 4, pl. xi, fig. 12 (dentition).

Amphisphyra globosa Verrill, Amer. Journ. Sci., xx, p. 392, Nov. 1880; Proc. U. S. Nat. Mus., iii, p. 382, 1880.

Specimens agreeing in all respects with Sars's figures, referred to above, were dredged at stations 870, 871, and 894, in 115 to 365 fathoms, off Martha's Vineyard, 1880; station 947, in 312 fathoms, 1881.

Philine amabilis Verrill.

Philine amabilis Verrill, Amer. Journ. Sci., pp. 392, 398, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 383, 1880.

PLATE LVIII, FIGURES 23, 24.

Several living specimens were taken at station 876, about 100 miles south of Newport, R. I., in 120 fathoms, 1880; at station 940, in 130 fathoms, 1881, one living; off Delaware Bay, station 1047, in 156 fathoms, 1881.

Philine cingulata G. O. Sars.

Philine cingulata G. O. Sars, op. cit., p. 297, pl. 26, figs. 7 *a-c*, pl. xii, fig. 3.

Verrill, Proc. U. S. Nat. Mus., iii, p. 384, 1880.

Off Cape Sable, Nova Scotia, in 90 fathoms. Taken off Martha's Vineyard at station 892, in 487 fathoms, 1880.

Philine fragilis G. O. Sars.

Philine fragilis G. O. Sars, op. cit., p. 296, pl. 18, figs. 11 *a-c*, pl. xii, fig. 2 (dentition).

Verrill, Proc. U. S. Nat. Mus., iii, p. 384, 1884.

Off Cape Sable, Nova Scotia, 90 fathoms, fine, compact sand, 1877; Jeffrey's Ledge, Gulf of Maine, 88 to 92 fathoms, 1874, several large living specimens.

Philine Finmarchica M. Sars.

Philine Finmarchica G. O. Sars, op. cit., p. 296, pl. 18, figs. 10 *a-d*; pl. xii, fig. 1 *a, b* (dentition).

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 384, 1880.

Off Cape Sable, Nova Scotia, 90 fathoms, fine sand, 1877; station 872, off Martha's Vineyard, in 86 fathoms, 1880; off Cape Cod, station 298, in 16 fathoms, 1879.

Philine tinctoria Verrill, sp. nov.

Shell broad, oblong, rather large for the genus, widest in the middle, very thin, tinged with smoky brown, not polished and without distinct spiral lines, but with very distinct, fine, close, sinuous, slightly raised, minutely wavy lines of growth. The apex is rounded and shows neither spiral whorls, nor a depression. The outer lip rises slightly above the body-whorl from which it is separated by a broad and deep notch; from the posterior shoulder to the anterior end

it is broadly flaring and convex, with a slight rounded angle about at the middle; anteriorly it is a little narrower and evenly rounded; the columella margin is slightly excurved, with a thin edge, in front of the middle, and is reflected against the body-whorl, where it joins it, leaving a slight groove behind it, and winding into the shell, it forms a distinct, raised spiral fold, separated from the more prominent, inner surface of the body-whorl by a concave groove.

Length, 10.75^{mm}; breadth, in middle, 8^{mm}; breadth of aperture, 7^{mm}.

Station 921, in 65 fathoms, two living specimens.

Koonsia, gen. nov.

Allied to *Pleurobrancha*, with which it agrees in the character of the head, tentacles, proboscis, and gill. It differs in having the back swollen and overhanging both on the sides and posteriorly, and a distinct mantle-edge all around, with a wide groove between it and the foot posteriorly, as well as laterally; the foot is narrower and prolonged posteriorly, with a specialized glandular area, near the end, beneath, and a conical papilla above, near the tip. The external reproductive organs appear less complicated than in *Pleurobrancha*. The verge is armed with small hooks, but the spicule, present in the latter genus, is not protruded in any of our specimens of *Koonsia*, if present; the urinal opening is at the anterior root of the gill; between this and the verge, some specimens show a small opening, and a low papilla, but none show the large opening and long flat papilla, present in *Pleurobrancha*, and usually well displayed in alcoholic specimens. Anal opening behind the base of the gill. Gill large, bipinnate, fully exposed on the right side, between the mantle and the foot.

This genus is dedicated to Mr. B. F. Koons, of the U. S. Fish Commission, in 1880 and 1881.

Koonsia obesa Verrill, sp. nov.

Body large, stout, broad, with a large, swollen back, smooth and white in the preserved specimens, and defined by the mantle-edge, which forms a rim along the lateral and posterior borders. Head large and broad, with two short, flat, posteriorly grooved, anterior tentacles, one at each corner; the anterior mantle-border runs between them, and supports a row of small papillæ. Posterior tentacles short, stout, flattened, ear-like, with the outer edges incurved, form-

ing a large groove. Proboscis very large, retractile, purple at the end, showing, when extended, the very broad radula, covered with very numerous sharp, hooked teeth, in many long curved rows. Foot broad and rounded anteriorly, with small auricles; long tapered, and acute posteriorly, extending some distance beyond the mantle; a conical papilla near the tip above; under side, near the end, with a narrow, elongated, depressed, glandular area, surrounded by a raised border; this is sometimes tinged with bright red, in alcohol; the rest of the foot is usually tinged with chocolate-brown. Gill large, bipinnate, deep purple. This species grows to a great size. One from station 939, was over 5 inches (128^{mm}) long; 4 inches (102^{mm}) wide; and about 2 inches (50^{mm}) high, even after preservation in alcohol. Off Martha's Vineyard, stations 895, 939, 946, 1025, in 216 to 258 fathoms. Off Delaware Bay, 1045, in 312 fathoms. At station 946, in 241 fathoms, seven young specimens were taken, some of them not over 1 inch long; these were associated with *P. tarda*.

Pleurobranchæa tarda Verrill.

Pleurobranchæa tarda Verrill, Amer. Journ. Sci., xx. pp. 392, 398, Nov., 1880;
Proc. U. S. Nat. Mus., iii, p. 384, 1880.

PLATE LVIII, FIGURE 26.

In the best preserved specimens the reproductive organs are often protruded, the forms of the different organs varying with the state of extension. The verge or most anterior organ, when fully extended, is long, cylindrical or a little clavate, with rows of minute recurved hooks near the end, and terminated by a slender, curved spicule. The most posterior opening (urinal) is just at the anterior base of the gill, in the form of a small papilla, with a central opening. Between these there are two organs, on a more or less swollen common base; the more anterior is a large opening with raised margin; a little behind and below this is a long, exsert, flat, usually tapered and acute, copulatory organ, varying much in size and form according to the state of extension. All these organs can be so retracted as not to be noticeable, but this seldom happens in alcoholic specimens, most of which show the organs more or less extended. The anal orifice is behind the base of the gill.

Taken in 1880, 20 miles south of Block Island (stations 814 to 817), in 38 fathoms; about 70 to 100 miles south and southwest from Martha's Vineyard (stations 865 to 879), in 65 to 192 fathoms, both on bottoms of mud and of fine, compact sand, very abundant

(240 specimens.) Off Chesapeake Bay, stations 896–900, in 31 to 300 fathoms. In 1881 it occurred at twenty-six stations, off Martha's Vineyard, in 28 to 310 fathoms. It was particularly abundant at stations 918 and 922, in 45 and 69 fathoms, (190 specimens). It is not common below 200 fathoms. Off Delaware Bay, stations 1043, 1047, in 130 and 156 fathoms.

With this species, and probably belonging to it, we often took gelatinous, but rather firm, cylindrical egg-clusters, about 20^{mm} long and 4^{mm} in diameter, with the eggs in several rows.

Closely resembles *Pleurobranchia Nova-Zelandia* in form and color. The latter is a littoral species.

Doridella obscura Verrill.

Doridella obscura Verrill, Amer. Journ. Sci., i, p. 408, figs. 2, 3, 1870; Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp. 400, 664 (auth. cop., p. 370), pl. 25, fig. 173, *a*, *b*, 1874.

FIGURE 5.

Long Island Sound, near New Haven, low-water mark to 5 fathoms; Vineyard Sound, low-water to 10 fathoms; off Block Island, station 824, 13 fathoms, 1880; Great Egg Harbor, N. J., 1 to 2 fathoms, 1872.

FIG. 5.



NUDIBRANCHIATA.

Issa lacera (Müller) Bergh.

Triopa lacer Lovén, Index Moll. Scand. Occid. [p. 6], 1846.

G. O. Sars, op. ult. cit., p. 311, pl. 27, figs. 4, *a-c*, pl. xiv, figs. 12*a*, *b*.

Verrill, Amer. Journ. Sci., xvi, p. 211, Sept., 1878.

Issa lacera Bergh, Monog. Polyceraden, II, p. 20, pl. 14, figs. 4–12, 1881, in Verh. K. K. Zool.-Bot. Gesellsch., Wien, 1880.

PLATE XLII, FIGURE 11.

This was first taken on our coast in 1873, by the U. S. Fish Commission party on the "Bache," at Cashe's Ledge and off Cape Ann, in 25 to 80 fathoms. Off Halifax, Nova Scotia, 90 to 92 fathoms, and Massachusetts Bay, 35 to 48 fathoms, 1877; and off Cape Cod, in 70 fathoms, 1879.

Issa ramosa Verrill and Emerton.

Issa ramosa Verrill and Emerton, in Verrill, Amer. Journ. Sci., xxii, p. 301, 1881.

PLATE LVIII, FIGURES 36, 36*a*.

Stations 940 and 949, in 130 and 100 fathoms, 1881.

Polycerella Emertoni Verrill.

Polycerella Emertoni Verrill, Proc. U. S. Nat. Mus., iii, p. 387, 1880.

This species was first taken by me at Wood's Holl, in September, 1875, at the surface among eel-grass; and on hydroids from the piles of Long Wharf, New Haven, Conn., October, 1875. At Newport, R. I., it was found by Mr. J. H. Emerton and the writer, in July and August, on filamentous algae, especially *Ceramium rubrum* and *Desmarestia viridis*, growing on the mooring buoys and piles of wharves in the harbor. In 1881, it was taken in considerable numbers in the harbor at Wood's Holl, among eel-grass, in August and September.

Idaliella pulchella Bergh.

Idalia pulchella Alder and Hancock, Brit. Nud. Moll., part 6, fam. 1, pl. 17, figs. 5-6.

G. O. Sars, op. cit., p. 313, tab. 28, fig. 1, *a-c*, tab. xiv, fig. 8, *a-d* (dentition), 1878. Verrill, Proc. Nat. Mus., ii, p. 198, 1879.

Idaliella pulchella Bergh, Arch. für Naturg., 47, i, [p. 7], 1881.

PLATE XLII. FIGURE 13.

This species was found, for the first time, upon the American coast, by Mr. J. H. Emerton, who discovered it at Salem, Mass., in 1879. His specimens agree very closely with Sars's description and figures, both in external characters and in dentition, but not so well with those of Alder and Hancock.

Idaliella modesta Verrill.

Idalia modesta Verrill, Amer. Journ. Sci., x, p. 41, pl. 3, fig. 3, July, 1875.

Block Island Sound and north of Little Gull Island, in 17 to 40 fathoms, 1874; Vineyard Sound and off No-Man's-Land, 1875.

Heterodoris Verrill and Emerton, gen. nov.

Form and general appearance somewhat like *Triopu* and *Triopulla*, but stouter, and without any trace of gills. Mantle forming an edge all around the back; surface of the back with scattered papillae; a longitudinal crest between and behind the dorsal tentacles, which are lamellose and retractile, without sheaths, but with a prominent fold of the mantle-margin in front of them. Head large, rounded, with a free, thin margin, which has a flat tentacular lobe, on each side. Foot broad, rounded in front. A large opening, apparently the anus, on the right side between the mantle and the foot, behind the middle. Verge, as protruded, stout, cylindrical, swollen and

rounded at the end, not armed; a short, stout, conical papilla just behind its base, and a lobe below it; farther back, nearer the anal (?) opening, there is a small, simple opening, probably urinal.

Odontophore broad, with very numerous small, strongly hooked, acute teeth in each row, all similar except a few near the center, which are less curved and not so acute; no median tooth.

This genus will probably have to be made the type of a new family, *Heterodoridæ*.

Heterodoris robusta Verrill and Emerton, sp. nov.

PLATE LVIII, FIGURES 35, 35a, 35b.

Body short, thickest anteriorly, back convex; head large and broad, rounded; foot broad, lanceolate. Dorsal tentacles stout, clavate, obtuse, lamellose. Longitudinal crest extending from front edge of mantle to some distance beyond the tentacles. Back sparsely covered with conical papillæ, unequal in size and irregularly placed. Mantle edge along the sides, undulated and crenulated. Radula with about 168 teeth in a transverse row.

Color in life, deep orange. Length of the preserved specimen, 28^{mm}; breadth, 15^{mm}; height, 11^{mm}.

Off Martha's Vineyard, station 1029, in 458 fathoms.

Doris complanata Verrill.

Doris complanata Verrill, Amer. Journ. Sci., xx, pp. 392, 399, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 386, 1880.

PLATE LVIII, FIGURES 34, 34a, 34b.

About 70 miles south of Martha's Vineyard, station 872, in 85 fathoms, among sponges (eleven specimens), 1880; stations 940, 949, 1038, in 100 to 146 fathoms, 1881, several large specimens. Off Delaware Bay, station 1043, in 130 fathoms, several specimens.

Acanthodoris ornata Verrill.

Acanthodoris ornata Verrill, Amer. Journ. Sci., xvii, p. 313, 1879.

PLATE XLII, FIGURE 12.

Eastport, Me., at low-water mark, August 19, 1872.

Acanthodoris citrina Verrill.

Acanthodoris citrina Verrill, Amer. Journ. Sci., xvii, p. 313, 1879.

Eastport, Me., at low-water mark, 1868, 1870.

This is closely related to *A. stellata* (= *A. pilosa*), which also sometimes occurs more or less marked with yellow colors. *A. bifida* V. is only a variety of *A. stellata*.

Adalaria proxima (Ald. and Han.) Bergh.

Doris proxima Alder and Hancock, Brit. Nud. Moll., Fam. i, pl. 9, figs. 10–16.

Adalaria proxima Bergh, Gatt. Nord. Doriden, Arch. für Naturgesch., 45, i, p. 362.

Verrill, Amer. Journ. Sci., xvii, p. 314, 1879.

Collected by the writer at Eastport, Me., at low-water mark, in 1864, 1868, 1870.

Lamellidoris muricata (Müller) Ald. and Han.

Lamellidoris muricata G. O. Sars, op. cit., p. 307, pl. xiii, fig. 6.

Bergh, op. ult. cit., p. 364.

Onchidoris muricata H. and A. Adams, Genera.

Verrill, Amer. Journ. Sci., xvii, p. 314, 1879.

Eastport, Me., at low-water mark. Specimens dredged at many localities, in 3 to 24 fathoms, from Block Island to Halifax, Nova Scotia, appear to belong to this species.

Lamellidoris diaphana Ald. and Han.

Onchidoris diaphana Verrill, Amer. Journ. Sci., xvii, p. 314, 1879.

Eastport, Me., at low-water mark, 1864, 1868, 1870.

Scyllæa Edwardsii Verrill.

Scyllæa Edwardsii Verrill, Amer. Journ. Sci., xvi, p. 211, Sept., 1878.

PLATE XLII, FIGURE 10.

Wood's Holl, Mass., in Little Harbor, attached to eel-grass and on *Sargassum*, autumn of 1877.—V. N. Edwards.

Dendronotus robustus Verrill.

Dendronotus robustus Verrill, Amer. Journ. Sci., vol. i, p. 405, fig. 1, 1870; Proc. Nat. Mus., ii, p. 197, 1879.

Dendronotus velifer G. O. Sars, Mollusca Reg. Arcticæ Norvegiæ, p. 315, tab. 28, fig. 2, tab. xv, fig. 4 (dentition), 1878.

The species well described and figured in the excellent work of Sars is identical with the American form. Our *D. robustus* was described from a specimen not fully grown; but we have since dredged it of larger size, agreeing with *D. velifer*, in numerous localities, Vineyard Sound to Nova Scotia, low-water mark to 98 fathoms; and south of Martha's Vineyard, station 869, in 192 fathoms. The dentition of our original specimen is like that of *D. velifer* figured by Sars.

Dendronotus elegans Verrill.

Dendronotus elegans Verrill, Amer. Journ. Sci.; Proc. U. S. Nat. Mus., iii, p. 385, 1880.

Off Cape Cod, station 330, in 26 fathoms, September 6, 1879.

Doto formosa Verrill.

Doto formosa Verrill, Amer. Journ. Sci., x, p. 41, pl. 3, fig. 4, July, 1875.

I took this species at Eastport, Me., and on the coast of Nova Scotia, in 1861. Long Island Sound to Breton Island, N. S. ! From low-water mark at Eastport, Me., to 50 fathoms, usually on hydroids.

Fiona nobilis Alder and Hancock.

Fiona nobilis Alder and Hancock, British Nud. Moll., Æolidæ, Fam. 3, pl. 38A.

Verrill, Amer. Journ. Sci., xxii, p. 300, 1881.

Fiona Atlantica Bergh. Vidensk. Meddelelser naturh. Forening, Kjöbenhavn, 1857, pp. 273-335, plates 2 and 3, figs. 1-53 (anatomy.)

A large and handsome *Fiona*, apparently this species, was found in two instances, in large numbers, among Anatifers, on pieces of floating timber, at stations 935 and 995.

Head very changeable in form, usually broadly rounded in front and laterally. Tentacles large, stout, both pairs about equal, tapering, acute, smooth; the posterior ones are placed rather far back. The foot is broad, posteriorly thin, lanceolate, and extends far back (12 to 15^{mm}) beyond the end of the mantle, obtuse at the end; anterior angles broadly rounded. Branchiæ very numerous, crowded, in a broad band on each side, leaving the middle of the back naked; they are elongated, compressed, fusiform, and have a free-edged, frilled membrane, along each edge of the dorsal side.

General color grayish brown, orange-brown, or dull orange, corresponding closely with the dark colored stems of the barnacles among which they were found. Body translucent white, often with a tint of orange on the back, and on the posterior part of the head; foot milk-white; numerous irregularly branched, internal, dark brown ducts run between and among the branchiæ, showing plainly through the skin; branchiæ with the nucleus yellowish brown, the outer sheath and free membrane pale orange; posterior tentacles tinged with orange. No eyes were detected.

Some of our specimens were kept in confinement several days and laid numerous clusters of eggs. These are in the form of a broad ribbon, spirally coiled in about one and a half turns, so as to form a

bell-shaped or cup-shaped form, and attached by a slender pedicel, so as to hang from the under side of objects. The largest specimens were over 50^{mm} long.

Alder and Hancock recorded the occurrence of the species, in a single instance, at Falmouth, England. Bergh's specimens were from the North Atlantic, south of Newfoundland.

Coryphella nobilis Verrill.

Coryphella nobilis Verrill, Proc. U. S. Nat. Mus., iii, p. 388, 1880.

PLATE XLII, FIGURE 15.

Off Cape Cod, station 326, in 75 fathoms, mud and broken shells, 1879. One specimen only.

Coryphella rutila Verrill.

Coryphella rutila Verrill, Amer. Journ. Sci., xvii, p. 314, April, 1879.

Collected by the writer, at Eastport, Me., low-water mark, 1864, 1868, 1872. It occurs both under stones, and on algae, etc., fully exposed to view, and very conspicuous on account of its brilliant red color and large size. It probably possesses netting cells powerful enough to protect it from the attacks of fishes. In that case its bright colors would serve as a protection, by warning off enemies, as is the case with bright colored Actiniæ.

Coryphella Stimpsoni Verrill.

Cuthona Stimpsoni Verrill, Amer. Journ. Sci., xvii, p. 314, 1879.

Coryphella Stimpsoni Verrill, Proc. U. S. Nat. Mus., iii, p. 388, 1880.

PLATE XLII, FIGURE 14.

This species occurs from Massachusetts Bay and Salem harbor, Mass., to Halifax, Nova Scotia, and from low-water, at Eastport, Me., to 51 fathoms, at Jeffrey's Ledge. This is closely allied to *C. salmonacea* (Couth.) V. (*non* Bergh).

Coryphella Mananensis (Stimp.) Verrill and Emerton.

Eolis mananensis Stimpson, Invert. Grand Manan, p. 26, 1853.

Coryphella mananensis Verrill, Proc. Nat. Mus., iii, p. 389, note, 1880.

This has bright red branchiæ, with white tips.

By Dr. Gould it was not distinguished from "*E. rufibranchialis*," and was, therefore, omitted from his report, as a genuine species. Whether the latter species actually occurs on our coast is doubtful.

This species sometimes occurs at low-water mark at Eastport, Me.,

and Grand Menan, but it is usually an inhabitant of rather deep water, on rocky bottoms. We have dredged it at many localities from off Fisher's Island and Block Island to Halifax, N. S., in 20 to 90 fathoms, among hydroids. It is the most common species at such depths.

Two or three related species of *Coryphella*, not yet characterized, are known to us, from the New England coast.

Cratena Veronicæ Verrill.

Cratena Veronicæ Verrill, Proc. U. S. Nat. Mus., iii, p. 389, 1880.

Off Cape Cod (stations 307, 328, 329, 331, 333), in 23 to 31 fathoms, among hydroids, September, 1879.

Galvinia exigua Alder and Hancock.

Æolis despectus (pars) Gould, ed. II, p. 248, pl. 16, figs. 222–225.

Salem and Boston, Mass., at low-water.

The genuine *Tergipes despectus* was first distinguished from *G. exigua* by Mr. J. H. Emerton, at Salem, Mass., in 1879. The species figured by Gould (Binney's edition) as *despectus*, is really the *Galvinia exigua* Alder & Hancock, differing widely in its dentition, there being three rows of teeth, instead of the single row, seen in *Tergipes*. But the *T. despectus* of my Report on Invertebrates of Vineyard Sound, 1873, was correctly named. Both species are found under the same conditions, on *Obelia*, etc., but, according to Mr. Emerton, *G. exigua* is found in the spring and early summer, while *T. despectus* occurs later in the summer and in autumn. *G. exigua* has not yet been found south of Cape Cod.

PTEROPODA.

Cymbulia calceolus Verrill.

Cymbulia calceolus Verrill, Amer. Journ. Sci., xx, pp. 392, 394, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 393, 1880.

PLATE LVIII, FIGURE 33.

The depth from which the specimens that were caught in the trawl came is uncertain, but as specimens have often been found in the stomachs of actiniae, starfishes, etc., it doubtless inhabits all depths, to the bottom. It grows to a very large size. Some of the living specimens were more than 3 inches across the wings, which are over one inch wide, and very delicate.

This was taken in large numbers at numerous stations, in 1880 and 1881, in the trawl. Living specimens were caught about 30 miles east-southeast of Block Island, at surface, October 2, 1880, by Messrs. Seudder and Edwards.

Cavolina tridentata (Forsk.) H. and A. Ad.

Hyalea tridentata Lamarck, Anim. sans. Vert., ed. II, vol. vii, p. 415.

Cavolina tridentata H. and A. Adams, Genera, i, p. 51, pl. 6, figs. 1, 1a.

Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp. 444, 669 (auth. cop., p. 375), pl. 25, fig. 177, 1874.

FIGURES 6, 7.

Of this species I have received numerous specimens, with the animal in good condition, obtained by Mr. Samuel Powell, from the stomach of a blue fish, at Newport, R. I., several years ago. In 1880, two living specimens were taken a few miles off Block Island, by Messrs. V. N. Edwards and N. P. Seudder, of our party. The fresh shells of this species were dredged by us in 1871, near Martha's Vineyard. In 1880 and 1881, we found it in abundance and perfectly fresh, in all our outer dredgings, 70 to 100 miles off shore. It was particularly abundant at stations, 880, 892, 894, 947, 998.

It was associated with *Diacria trispinosa* Gray and several other species, named below, but was far more numerous than any of the others. I have often taken it from the stomachs of actiniæ, and from *Archaster*, and other starfishes, from the deep water stations.

Cavolina uncinata (D'Orb.) Gray, 1850; H. & A. Ad.

Hyalea uncinata D'Orb, 1836.

Rang, Hist. Nat. Pterop., p. 37, pl. 2, figs. 11-14, 1852.

Cavolina uncinata Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 392, 1880.

This occurred with the last off Martha's Vineyard, 70 to 90 miles, stations 865, 867, 870, 876, 892, 894, 947.

Cavolina longirostris (Les. MSS., Bv.) H. & A. Ad.*Hyalea longirostris* Blainv., Dict. Sci. Nat., xxii, p. 81.

Rang. Hist. Nat. Pterop., p. 41, pl. 2, figs. 7-10, 1852.

Cavolina longirostra Gray, Catal. Moll. Brit. Mus., Pteropoda, p. 8.*Cavolina longirostris* Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 392, 1880.

This small but elegant species occurred frequently in our dredgings, 70 to 105 miles off Martha's Vineyard, but not in large numbers (stations 867, 870, 871, 876, 891, 892, 894, 895, in 1880; 949, 994, 997, 999, 1038, in 1881).

Cavolina inflexa (Les.) Gray.*Hyalea inflexa* Lesueur; Blainv., Dict. Sci. Nat., xxii, p. 80.*Cavolina inflexa* Verrill, Proc. U. S. Nat. Mus., iii, p. 392, 1880.

One perfect and full-grown specimen from station 894.

Clio pyramidata Browne; Linné; Gmelin.*Cleodora pyramidata* Peron & Les.; Lamarek.*Cleodora lanceolata* Rang, Ann. des Sci. Nat., xvi, p. 497, pl. 19, fig. 1.*Clio pyramidata* Gray, Catal. Moll. Brit. Mus., Pteropoda, p. 12, 1850.

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 392, 1880.

Several fresh but somewhat broken specimens of this species occurred at stations 865, 891 to 894, off Martha's Vineyard.

Pleuropus Hargeri Verrill, sp. nov.*Pleuropus* sp., Smith & Harger, Trans. Conn. Acad., iii, pp. 26, 27.

Shell small, translucent, pale yellowish white, compressed, with the two lips of the aperture nearly equal, forming nearly a semi-circle in the larger specimens and more than half a circle in the younger ones. Back of the lateral angles, where the aperture terminates, the body of the shell is triangular, with slightly concave sides, and tapers off gradually posteriorly to a caudal process, about as long as the shell itself, subacute at tip, and often bent somewhat to one side. The animal has three long, slender, subfiliform processes on each side, which project from the lateral angles of the aperture; the younger specimens have but two of these.

Off George's Bank, N. lat. $41^{\circ} 25'$; W. long. $65^{\circ} 5'$ to $30'$, Sept. 15, 1872, taken both at 10 to 12 o'clock A. M. and at 2 P. M., by Messrs. S. I. Smith and Oscar Harger on the "Bache." I have dedicated the species to Mr. Harger.

Balantium recurvum Children.

Journ. Roy. Inst., xv, p. 220, pl. 7, fig. 107, 1829.

Gray, Catal. Moll. Brit. Mus., Pteropoda, p. 14, 1850.

Cleodora balantium Rang, Mag. Zool., 1834; Hist. Nat. Pterop., p. 52, pl. 5, fig. 12; pl. x, fig. 7, 1852.

Balantium recurvum Verrill, Proc. U. S. Nat. Mus., iii, p. 393, 1880.

Fresh fragments occurred at stations 865, 867, 869, and 895, off Martha's Vineyard.

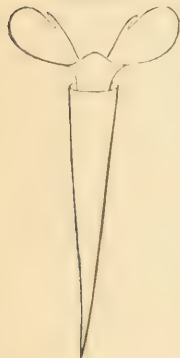
Styliola vitrea Verrill.

Styliola vitrea Verrill, Amer. Journ. Sci., iii, p. 284, pl. 6, fig. 7, 1872.

Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp. 443, 668, pl. 25, fig. 178, 1874 (auth. cop., p. 374).

FIGURE 8.

FIG. 8.



Shell long, conical, slender, gradually tapering, acute, slightly curved near the end, thin, transparent, white, and almost glassy, with the surface smooth and polished, without sculpture. Animal mostly white, fins obovate, broadly rounded at the outer end, bearing the slender, acute tentacles on the anterior edge, near the middle. Length, 11.5^{mm}; diameter, 2^{mm}.

Taken at the surface, in the afternoon, among *Salpæ*, off Gay Head, mouth of Vineyard Sound, Sept. 9, 1871.

Styliola recta (Lesueur, MSS.) Blainv.

Styliola recta Blainv., Man. Malac., 1825.

Verrill, Proc. U. S. Nat. Mus., iii, p. 393, 1880.

Creseis acicula Rang, Ann. des Sci. Nat., I, xiii, p. 318, pl. 17, fig. 6, 1828.

Creseis clava Rang, Ann. des Sci. Nat., I, xiii, p. 317, pl. 17, fig. 5, 1828.

Creseis acus Esch., Zool. Atlas, iii, pl. 15, fig. 2, 1831.

Cleodora acicula Rang, Hist. Nat. Pterop., p. 56, pl. 7, figs. 5, 7, 1852.

This is an exceedingly slender, elongated, and delicate species.

Taken near George's Bank, N. latitude 41° 25', W. longitude 65° 5' to 65° 30', September 15, 1872, at surface, by Messrs. S. I. Smith and O. Harger, on the "Bache."

Styliola virgula (Rang) Gray.

Creseis virgula Rang, Ann. des Sci. Nat., I, xiii, p. 316, pl. 17, fig. 2, 1828.

Cleodora virgula Rang, Hist. Nat. Pterop., p. 57, pl. 13, figs. 20-24, 1852.

Styliola virgula Verrill, Proc. U. S. Nat. Mus., iii, p. 393, 1880.

Near George's Bank, September 15, 1872, "Bache," with the preceding.

Triptera columnella Rang.

Off Martha's Vineyard, station 947, 1881.

Spirialis MacAndrei Forbes and Hanley, ii, p. 384.

Spirialis retroversus (Flem.), variety ? *MacAndrei*, Jeffreys, Brit. Conch., v. p. 115, pl. 4, fig. 4; pl. 98, fig. 5.

G. O. Sars, Moll. Reg. Arct. Norv., p. 330, pl. 29, figs. 3 a-f, pl. xvi, fig. 19 (dentition).

Spirialis MacAndrei Verrill, Proc. U. S. Nat. Mus., iii, p. 393, 1880.

Several entire and perfectly fresh specimens, some living, occurred at station 894. Other specimens were taken at 891 and 947. At one station many living specimens were obtained in the trawl-wings, presumably, therefore, from close to the bottom.

SOLENOCONCHA or SCAPHOPODA.

Siphonodentalium vitreum M. Sars.

Siphonodentalium vitreum G. O. Sars, op. cit., p. 103, pl. 7, figs. 2 a-c, pl. i, figs. 2 a-f (dentition).

Verrill, Proc. U. S. Nat. Mus., iii, p. 394, 1880.

PLATE XLII, FIGURE 19.

A fine, large specimen (fig. 19), probably belonging to this species, but with the apex broken, was dredged by the party on the "Bache," in 1873, in the Gulf of Maine (station 12 B), in 60 fathoms, mud.

Another specimen, with the apical notches complete, and 10^{mm} long, 2.5^{mm} broad, was dredged in the Gulf of Maine, 107 fathoms (station 9 B), 1873.

Off Martha's Vineyard, at stations 892, 949, 994, in 100 to 487 fathoms, specimens were taken that probably belong to this species, but the apex is broken in every case.

Siphonentalis affinis (Sars).

Siphonentalis affinis G. O. Sars, op. cit., p. 104, pl. 20, fig. 12

Verrill, Proc. U. S. Nat. Mus., iii, p. 395, 1880.

PLATE XLII, FIGURE 20, *a*, *b*.

A specimen, which I refer to *S. affinis*, smaller and more slender than the preceding species, was dredged by us, in 1877, in Bedford Basin, near Halifax, Nova Scotia, 35 fathoms, soft mud.

It is a smooth, glossy, translucent shell, slightly curved, with a round aperture. The posterior aperture has only one slight notch.

Length, 6^{mm}; diameter, 1^{mm}.

Siphonentalis Lofotensis (M. Sars).

Siphonentalis Lofotensis G. O. Sars, Moll. Reg. Arct. Norv., p. 104, pl. 20, figs. 11 *a*, *b*, pl. i, fig. 3.

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 395, 1880.

A few specimens, agreeing well with the figures and description of this species, were taken at station 871, in 115 fathoms, 891, in 500 fathoms, and 947, in 312 fathoms.

Cadulus Pandionis Verrill and Smith.

Cadulus Pandionis Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 392, 399, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 395, 1880.

PLATE LVIII, FIGURES 30, 30*a*.

This large and highly polished species occurred at many of the stations, but most abundantly at 869 to 871 and 873 to 877, in 85 to 192 fathoms, and 949 in 100 fathoms. Other stations are 891, 894, 895, 898, 943, 945, 947, 949, 994, 997-999, 1028, 1038, in 100 to 500 fathoms.

Cadulus propinquus G. O. Sars.

Cadulus propinquus G. O. Sars, Moll. Reg. Arct. Norv., p. 106, pl. 20, figs. 15 *a*, *b*; pl. i, fig. 5 (dentition).

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 395, 1880.

PLATE LVIII, FIGURES 31, 32.

This species, like others of the genus, varies considerably in form and proportions. I have figured two forms from camera-drawings.

This occurred in considerable numbers, living, at station 871, in 115 fathoms; it was also taken at station 873, in 100 fathoms; and at 949, 100 fathoms, 1881. It is a small, polished species, rather stouter and more swollen than the next.

Cadulus Jeffreysii Monterosato.

Cadulus subfusiformis? Jeffreys, British Conch., v, p. 196, pl. 101, fig. 3 (*non* Sars, teste Monterosato).

Cadulus Jeffreysii Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 395, 1880.

This is, perhaps, only a variation of the preceding species. Station 871, in 115 fathoms, off Martha's Vineyard.

LAMELLIBRANCHIATA.

Xylophaga dorsalis (Turton) Forbes and Hanley.

PLATE XLIV, FIGURE 9.

Many living specimens of this species have been found in bits of old wood, dredged by the U. S. Fish Commission, in Casco Bay, 1873; Gulf of Maine, in 100 to 110 fathoms, about thirty miles off Cape Ann, 1877; and in various parts of Massachusetts Bay and Cape Cod Bay. It had previously been recorded by Mr. J. F. Whitcaves from Gaspé Bay. Off Martha's Vineyard, stations 880 and 998, in 252 and 302 fathoms, 1880 and 1881. Found on the European coast south to the Adriatic.

Næra multicostata Verrill and Smith.

Næra multicostata Verrill and Smith, in Verrill, Proc. U. S. Nat. Mus., iii, p. 398, 1880.

Næra alternata Dall, Bulletin Mus. Comp. Zool., ix, p. 110 (no description) 1881, (*non* D'Orbigny).

PLATE LVIII, FIGURE 40.

This fine, large species is easily distinguished from most others by the numerous fine radiating ribs, on the anterior half, changing posteriorly to much coarser and more distant ones, the largest close to the base of the rostrum. The rostrum itself is moderately long and decidedly narrow and pinched up, usually with a strong incurvature at the base, on the ventral side, and with the dorsal outline more or less concave, descending lower than the hinge-line. Anteriorly the dorsal margin rises above the beaks, and is broadly rounded. The cartilage-pit is broad, rounded-triangular, and is strongly bent downward from the hinge-margin, in the left valve; the posterior lateral tooth of the right valve is low and long, continuous with the cartilage-pit, and with a very obtuse summit, which is often strongly excurved. Commencing behind the beaks, beneath

the hinge-plate, there is a more or less marked rib, running outward and backward, at the base of the rostrum. The rostrum is somewhat variable in form and sculpture; it is usually slightly turned up at the end; commonly it is more or less covered with small, unequal, radiating ribs, stronger on the ventral half, and distinctly lamellose on the dorsal side, toward the end; sometimes the ribs are obsolete on the basal portion.

Variety, **curta** Jeffreys.

Neæra curta Jeffreys, Ann. and Mag. Nat. Hist., Dec., 1876, p. 495 (name, not described); Proc. Zool. Soc. London for Nov., 1881, p. 943, pl. 71, fig. 10, Apr., 1882.

Some specimens, from station 871, in 115 fathoms, agree so well with the form recently described and figured by Mr. Jeffreys, that I do not hesitate to consider the latter a variety of this species. Our specimens of this variety differ from the typical form in having a shorter and more upturned rostrum; in the radiating ribs on the anterior half becoming much finer, and sometimes almost obsolete; and in the somewhat shorter and rounder form of the shell, it being more abbreviated anteriorly.

Mr. Dall identifies our typical shells, which I sent him for comparison, with the species recorded by him, as probably *N. alternata* D'Orb. To me, D'Orbigny's shell appears to be a distinct, though allied, species.

Jeffreys, in the paper last quoted, suggests that our shell is identical with his *N. striata*, but the latter has numerous, nearly equal, small, radiating ribs, not becoming decidedly stronger and wider apart posteriorly, as they do in our shell, and as they were described in our original description. Perhaps all these forms may eventually prove to be varieties of one species.

In 1880, this was dredged at about 90 to 100 miles south of Newport, R. I., and Martha's Vineyard, in 85 to 120 fathoms, stations 871, 873, 874, 876. Several living specimens of various sizes. In 1881 it was taken at stations 949, 1035, 1038, 1040, in 93 to 146 fathoms.

Gulf of Mexico, 84–152 fathoms, "Blake" Expedition (t. Dall). Off the coast of Europe, "Porcupine" Expedition; off Bermuda, "Challenger" Expedition; off the Azores, "Josephine" Expedition (t. Jeffreys, as *N. curta*).

***Neæra perrostrata* Dall.**

Neæra ornatissima (D'Orbigny), var. *perrostrata* Dall, Bulletin Mus. Comp. Zool., ix, p. 110, 1881.

This shell has been examined by Mr. Dall and identified with those from the "Blake" Exp., described by him. It seems to me a species quite distinct from the one figured by D'Orbigny, if his figures are at all reliable.

This species is related to the preceding one. It is a smaller shell, narrower and longer than the young of *N. multicostata* of the same size, less ventricose, and with a decidedly longer and straighter rostrum, which does not distinctly turn up at the end. The ribs are fewer in number and much higher and thinner, with perpendicular sides, while those on the anterior half of the shell become only a little and gradually smaller and closer. The rostrum has a diagonal keel, and in some examples the ventral half is covered with several ribs; while in others it is without any, below the keel.

Off Martha's Vineyard, stations 871, 874, 876, in 85 to 120 fathoms, 1880. Gulf of Mexico, 339 fathoms,—Dall.

***Neæra lamellosa* M. Sars.**

Neæra lamellosa M. Sars, Chr. Vidensk.-Selsk. Forhandl., 1868, p. 257 (name without description).

Neæra jugosa G. O. Sars, op. cit., p. 88, pl. 6, figs. 9 *a-c* (*non* S. Wood).

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 398, 1880.

Neæra lamellosa Jeffreys, Moll. of Lightning and Porcupine Exp., in Proc. Zool. Soc. London for Nov., 1881, p. 940, Apr., 1882.

Jeffreys, in the paper last quoted, considers the fossil, *N. jugosa*, distinct from the recent species.

This species is easily distinguished from all others hitherto found on our coast by its raised, concentric lamellæ. Stations 892, 894, in 487 and 365 fathoms, off Martha's Vineyard, 1880; station 947, in 312 fathoms, 1881.

On the European coast, it is found from Finmark and Bergen south to Palermo. Bay of Biscay,—Jeffreys.

Neæra rostrata (Spengler) Lovén.

Neæra rostrata Lovén, Ind. Moll. Scand. Occid., p. 47 (description), 1846.

G. O. Sars, op. cit., p. 89, pl. 6, figs. 7 *a*, *b*,

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 398, 1880.

PLATE LVIII, FIGURE 39.

This is easily distinguished from our other smooth species by its very long and narrow posterior rostrum, and by the oval form of the shell. It has a nearly smooth surface.

Several specimens of this species were dredged by us in 1880, about 70 to 75 miles south of Martha's Vineyard, stations 870-874, in 85 to 155 fathoms, and 90 to 100 miles south from Newport, R. I., stations 876, 892, 894, in 120 to 500 fathoms.

In 1881, it occurred at stations 921, 949, 1035, 1036, 1038, 1040, in 65 to 146 fathoms. At station 949, in 100 fathoms, 15 specimens were taken.

On the European coast, from Lofoten I. to the Adriatic Sea. North Sea; Bay of Biscay, etc. West Indies, off Barbadoes and Sand Key, 80 to 100 fathoms, "Blake" Expedition (t. Dall). Off Patagonia (t. Jeffreys).

Neæra glacialis G. O. Sars.

Neæra glacialis G. O. Sars, op. cit., p. 88, pl. 6, figs. 8 *a-c*.

Verrill, Proc. U. S. Nat. Mus., iii, p. 397, 1880.

Neæra arctica Verrill, Amer. Journ. Sci., vi, p. 440, 1873; vii, p. 412, 1874 (? *non N. arctica* M. Sars.)

PLATE XLIV, FIGURES 10, *a*, *b*.

This is, by far, the commonest species of *Næra* found on our coast. It occurs in 30 to 500 fathoms.

Among our numerous specimens there is considerable variation in the form and texture of the shell, character of the surface, size and form of the cartilage-pit (see fig. 10, *a*), and in the form of the lateral tooth. Moreover, the form of the cartilage-pit and lateral tooth is not closely correlated with the form of the shell and length of the rostrum.

I find among our shells, not only forms corresponding to the figures of *N. glacialis* (fig. 10, *b*) and *N. obesa* (fig. 10, *c*) by G. O. Sars, but many, also, that are intermediate between his *N. glacialis* and *N. arctica*. There are few, if any, that have the beak so short and broad as he figures it in *N. arctica*. But many of our larger shells (see fig. 10, *a*) have the form and size of cartilage-plate characteristic of *N. arctica*, as figured by Sars. The greater number of our larger

shells were, therefore, referred by me to that form, at first, and Jeffreys has, also, identified similar Gulf of St. Lawrence shells as *N. arctica*. It is possible, therefore, that *N. arctica* (Sars) is only another variation of the same species, with the beak shorter and broader than usual.

This species, in all its forms, is nearly smooth, except for the more or less evident, slightly raised lines of growth, but it is usually more or less covered, especially when large, with a thin coating of fine mud or sand, easily removed. Young shells are smoother, cleaner, and more or less transparent. The rostrum is moderately long, not separated from the body of the shell by any marked sinus, the shell gradually narrowing into the rostrum, which tapers more or less to the end, and has a somewhat concave outline below; tip more or less broadly truncated; dorsal edge nearly straight, and regularly sloping from the hinge to the tip. Anterior-ventral border of the shell somewhat expanded; the anterior end evenly rounded. Umbos swollen. The posterior lateral tooth, in the left valve, is a strong, elongated, raised ridge, variable in length, but not sharp-triangular as in the next species; it is continuous with the cartilage-pit, from which it is separated only by a small notch.

The several forms of this species are common on muddy bottoms, in 50 to 192 fathoms, off the coasts of northern New England and Nova Scotia. We have dredged it, since 1872, off Cape Cod, off Cape Ann, off Casco Bay, in the Bay of Fundy, and in numerous localities in the Gulf of Maine and off Nova Scotia. South of Newport and Martha's Vineyard, it occurred at thirty-four stations, in 65 to 500 fathoms, in 1880 and 1881.

Off Chesapeake Bay, station 898, in 300 fathoms, 1880. Off Delaware Bay, station 1049, in 435 fathoms, 1881. Gulf of St. Lawrence! (coll. Whiteaves). On the European coast, it is found from Spitzbergen and northern Norway to the Azores.

Neæra obesa Lovén.

Neæra obesa Lovén, Ind. Moll. Scand. Occid., p. 48, 1846.

G. O. Sars, op. cit., p. 86, pl. 6, figs. 4 a-c.

Verrill, Amer. Journ. Sci., v, p. 101, 1872; Proc. U. S. Nat. Mus., iii, p. 398, 1880.

Neæra pellucida Stimpson, Invertebrata of Grand Manan, p. 21, pl. 1, fig. 13, 1853.

PLATE XLIV, FIGURE 10, c.

This species differs from the preceding in the somewhat broader and rounder form of the shell, more swollen and convex ventrally;

in the shorter rostrum, with its dorsal outline concave, and the end more or less turned up, and often a little bent or twisted laterally; and in the posterior lateral tooth of the right valve, which is short-triangular, rising up into a distinct point, and usually distant from the cartilage-pit, which is small, and usually projects sharply inward from the margin, forming a distinct angle on each side. The nucleus is minute, round, glossy, not so closely appressed to the edge as in the preceding species. The shell is white, nearly smooth, translucent. The largest specimens are about 15^{mm} long.

Off Martha's Vineyard, stations 869, 891 to 895, in 192 to 500 fathoms, 1880; stations 938, 947, 991, 997, 998, 1028, in 302 to 410 fathoms, 1881. Off Chesapeake Bay, station 898, in 300 fathoms. Bay of Fundy, 1872; Gulf of Maine, stations 1B, 3B, 5B, 45B, 74B, 75B, in 52 to 92 fathoms, 1873, 1874; off Cape Cod, station 362, in 106 fathoms, 1879.

Some of our specimens approach *Neora subtorta* G. O. Sars, in the form of the shell, curve of the rostrum, and structure of the hinge, but I am unable to separate these, by any constant characters, from the ordinary forms. Perhaps the true *N. subtorta*, of Europe, may be only a variety of this species. *N. pallucida* Stimpson is a young shell, of the *N. obesa* pattern. I have dredged the same form, as well as larger examples, in the same localities where his were obtained.

Poromya granulata (Nyst) Forbes and Hanley.

Poromya granulata G. O. Sars, op. cit., p. 90, figs. 6 a, b.

Verrill, Trans. Conn. Acad., v, pl. 44, figs. 3, 4; Proc. U. S. Nat. Mus., iii, p. 396, 1880.

Dall, Bull. Mus. Comp. Zool., ix, p. 108, 1881.

Embla Korenii Lovén, Ind. Moll. Scand. Occid., p. 46, cuts, 1846.

PLATE XLIV, FIGURES 3, 4.

Several adult, living examples of this shell were dredged in 1872 by Dr. A. S. Packard and Mr. C. Cooke, on the Coast Survey steamer "Bache," in the Gulf of Maine, in 150 fathoms, mud. In 1880, it was taken at stations 865-867, in 65 fathoms, and 874 in 115 fathoms. In 1881, it occurred at stations 940, 949, 1035, 1036, 1038, 1040, in 93 to 146 fathoms.

Gulf of Mexico and W. Indies, 15 to 229 fathoms, Blake Exp. (t. Dall.) On the European coast, from Lofoten I. to Madeira and the Adriatic Sea.

Fossil in the Pliocene of England, southern France, Calabria, and Sicily (t. Jeffreys).

Variety, **rotundata** Jeffreys.

Poromya rotundata Jeffreys, Annals and Mag. Nat. Hist., Dec., 1876, p. 494 (Valorous Expedition Mollusca).

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 396, 1880.

South of Martha's Vineyard, stations 865 and 871, 65 to 115 fathoms, living. North Atlantic, 1,450 fathoms (Jeffreys).

Having recently had opportunities to examine a larger series of specimens of this species, I am convinced that the form, *rotundata* Jeffreys, formerly recognized by me cannot be considered as specifically distinct. Intermediate forms are of frequent occurrence.

As a variety, it differs from the ordinary form only in being somewhat more rounded in form, and in having the surface more closely and uniformly covered with granules. In the last character, this species varies greatly.

Pecchiolia abyssicola G. O. Sars.

Pecchiolia abyssicola G. O. Sars, Remarkable Forms of Anim. Life, i, p. 25, pl. 3, figs. 21-43, 1872; Moll. Reg. Arct. Norv., p. 108, pl. 20, figs. 5 a-d, 1878.

Lyonsiella abyssicola M. Sars, 1878; Friele, Catal. Norv. N.-meer Exp. Spitzbergen. Moll., p. 268, 1879.

Verrill, Proc. U. S. Nat. Mus., iii, p. 396, 1880.

This little fragile shell may be distinguished by its quadrangular form, with the beaks incurved, and the surface covered with low radiating ribs, to which fine sand often adheres. The shell is very thin and somewhat pearly. The hinge-margin is thin, and the teeth obsolete.

Several good living specimens of this interesting addition to the American fauna were dredged by our party, in 1850, south of Martha's Vineyard and Newport, in 192 to 500 fathoms, fine, compact sand and mud, at stations 869, 880, 891, 892, 894. In 1881, it occurred at stations 947, 997, in 312 and 335 fathoms.

On the European coast from Spitzbergen (656 fathoms,—Friele), to Denmark. Davis Straits,—Valorous Exp. West of Ireland, 90 to 420 fathoms; off the English Channel, 557 fathoms; off the coast of Spain, 994 to 1095 fathoms, Porcupine Exp. (t. Jeffreys.)

Pecchiolia gemma Verrill.

Lyonsiella gemma Verrill, Proc. U. S. Nat. Mus., iii, p. 396, 1880.

Shell small, white, iridescent, broad-oval, widest and broadly rounded anteriorly, expanded and broadly rounded ventrally, pos-

terior end short, narrowed, and tapered to an obtuse point. The beak is subcentral, but a little nearer the anterior end, prominent, inflated, strongly curved inward and forward. Dorsal margin abruptly incurved opposite the beaks and decidedly expanded and excavated in front of them, so as to rise nearly to a level with the umbos; internally, opposite the tips of the beaks, there is a smooth swelling, within the margin. Hinge-margin thin, toothless, but with an internal scar behind the beaks, where the ligament was attached. Sculpture numerous, very delicate, slightly raised lines, which radiate from the beaks over the whole surface; they are separated by much wider interspaces, which are smooth and iridescent, and not at all excavated. Length, 4.5^{mm}; height (beak to ventral margin), 4^{mm}.

One perfect specimen, station 892, 487 fathoms, associated with *L. abyssicola*.

I have had no opportunity to examine the fossil shell which was the type of *Peechiolia*, and therefore, in view of the differences of opinion among European authors, am very uncertain whether it is congeneric with the two preceding species. If not, then they should both be referred to *Lyonsiella* M. Sars. Jeffreys adopts *Peechiolia* for this group, to which he also unites *Verticordia*.

Verticordia cælata Verrill, sp. nov.

Shell small, pearly within, rounded-oblong, with the beaks acute, prominent, and strongly curved forward. Eleven strong, sharply elevated, radiating ribs, separated by wider, deep, concave furrows, cover rather more than the anterior half of the shell; the most posterior of these ribs are lower and wider apart; these are followed by a posterior-lateral area, without ribs, but covered with fine granules, beneath which the surface is finely, radially striated; close to the extreme posterior margin there are two small ribs. The whole surface between the ribs was probably finely granulated. The ribs project, as denticles, beyond the edge of the shell. The anterior border of the shell is a little prominent and convexly rounded, more broadly rounded ventrally; the posterior-ventral margin is subtruncated, with an angle where it joins the rounded posterior-dorsal margin; anterior-dorsal margin, in front of the beak, strongly indented. Right valve with a large, rounded, prominent, blunt tooth, just below the beak; in front of this, a deep, V-shaped notch or sinus, formed by a sharp inbending of the hinge-margin, which is thickened and forms a triangular tooth-like projection within. Behind

the beak there is a long, raised lateral tooth or lamina, separated from the margin by a deep ligamental groove.

Length of the shell, 3^{mm}; from beak to ventral margin, 2.5^{mm}.

Off Martha's Vineyard, station 949, in 100 fathoms, one dead specimen.

If *Verticordia* and *Pecchiolia* are to be united, and the latter name used for the entire group, as has been done by Jeffreys, in his paper last quoted, this species will have to stand as *Pecchiolia calata*. The two genera appear to me sufficiently distinct, however.

Mytilimeria flexuosa Verrill and Smith.

Verrill, Amer. Journ. Sci., xxii, p. 302, 1881.

PLATE LVIII, FIGURE 38.

Station 947, in 312 fathoms, 1881. One pair of valves, dead, but in good condition.

Kennerlia glacialis (Leach) Carpenter.

Carpenter, Proc. Zool. Soc. London, Nov., 1864, p. 603.

Pandora glacialis Leach, Ross's Voyage, appendix, p. 174.

Leche, Kongl. Vetensk.-Akad. Handl., xvi, p. 11, pl. 1, figs. 1 a, b, 1878 (author's copy).

Kennerlia glacialis Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 397, 1880.

This differs from the common *Ctiliophora trilincata* Cpr. (= *Pandora trilincata* Say), in the absence of the internal radiating ridges, in its more inequilateral and irregular form, and in the greater convexity of the upper valve. The lower valve is very flat, or even concave, and is marked externally with several distinct radiating lines.

Living specimens of this arctic shell were dredged at stations 873, 918, 920, 949, in 45 to 100 fathoms, off Martha's Vineyard. It had previously been recorded from Gaspé, Gulf of St. Lawrence, by Whiteaves, and Murray Bay, by Dawson. Spitzbergen,—Friele, Leche.

Fossil in the Post-pliocene of Saco, Me., and St. John, N. B.

Pholadomya arata Verrill and Smith.

Pholadomya arata Verrill and Smith, in Verrill, Amer. Journ. Sci., xxii, p. 301, 1881.

PLATE LVIII, FIGURE 37.

Stations 940, 949, 950, in 69 to 130 fathoms, 1881, south of Martha's Vineyard. Three specimens, all dead, but one is very fresh. Length, 36^{mm}; height, 29^{mm}; breadth, 26^{mm}.

Syndosmya lioica Dall.

Dall, Bulletin Mus. Comp. Zool., ix, p. 133, 1881.

Station 871, in 115 fathoms, 1880, one broken specimen; 949, in 100 fathoms, three examples. Gulf of Mexico, 30 to 805 fathoms, "Blake" Exp. (t. Dall).

I have compared our shell with specimens sent to me by Mr. Dall.

Gastranella tumida Verrill.

Gastranella tumida Verrill, Amer. Journ. Sci., iii, p. 286, pl. 6, figs. 3, 3a, 1872.

Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, pp. 418, 678 (auth. cop., p. 384), pl. 27, fig. 190, 1874.

FIGURE 9.



FIG. 9.

This species has not been met with since it was originally dredged in Long Island Sound, off New Haven. It was found nestling in holes and cavities among sponges, bryozoa, and the roots of hydroids, on a shelly bottom, in 4 to 6 fathoms.

Abra equalis Say.

Abra equalis Say, Amer. Conch., iii, pl. 28, 1831.

Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, p. 679 (auth. cop., p. 385), 1874.

Recorded by Linsley from Stonington, Conn., from stomachs of cod. Its occurrence north of Cape Hatteras needs verification. It is abundant at Fort Macon, N. C.

Angulus tenellus Verrill.

Angulus modestus Verrill, Amer. Journ. Sci., vol. iii, p. 285, pl. 6, figs. 2, 2a, 1872 (non Carpenter, 1864).

Angulus tenellus Verrill, Rep. Invert. Anim. Vineyard Sd., in Rep. U. S. Fish Com., i, p. 677, pl. 30, fig. 224, 1874 (auth. cop., p. 383).

This may be only a variety of *Angulus tener*.

Long Island Sound, Narragansett Bay and Vineyard Sound, 1 to 10 fathoms.

Macoma inflata (Stimp. MSS.) Dawson.

Dawson, Canadian Naturalist, vi, p. 377, 1872.

Murray Bay,—Dawson; Gulf of St. Lawrence! (coll. Whiteaves.) Fossil in the Post-pliocene at Rivière-du-Loup, Canada.

Cardium (Fulvia) peramabilis Dall.

Dall, Bulletin Mus. Comp. Zool., ix, p. 132, 1881.

Cardium, sp. Verrill, Proc. Nat. Mus., iii, p. 407, 1880.

Station 871, in 115 fathoms, 1880, one valve. Gulf of Mexico, 50 to 119 fathoms, "Bache" and "Blake" Exp. (t. Dall).

I have identified our shell by direct comparison with specimens sent to me by Mr. Dall.

Diplodonta turgida Verrill & Smith.

Diplodonta turgida Verrill & Smith, in Verrill, Amer. Journ. Sci., xxii, p. 303, 1881.

PLATE LVIII, FIGURE 42.

Station 950, in 69 fathoms, 1881, off Martha's Vineyard.

Loripes lens Verrill & Smith.

Loripes lens Verrill & Smith, in Verrill, Amer. Journ. Sci., xx, pp. 392, 400, Nov. 1880; Proc. U. S. Nat. Mus., iii, p. 400, 1880.

Dredged in 1879 in many localities off Cape Cod, in 50 to 100 fathoms. Common at many of the outer stations, in 60 to 192 fathoms, stations 865-877, 920-924, 943, 944, 949, 950, 1038, 1040, of 1880 and 1881.

Axinopsis orbiculata G. O. Sars.

Axinopsis orbiculata G. O. Sars, op. cit., p. 63, pl. 19, figs. 11a-d.

Axinus orbicularis (Wood) Friele, Jan Mayen Moll., p. 3, pl., figs. 3-3c.

Axinus orbiculatus Friele, Catal. Norwæg. Nordmeer-Exp. Spitzbergen Moll., p. 268, 1879.

Broad Sound, Casco Bay, 15-30 fathoms, 1873; Halifax, N. S., 18 fathoms, 1877,—U. S. Fish Com. Vadsø, 60 to 100 fathoms,—G. O. Sars. Spitzbergen and Jan Mayen I., 10 to 15 fathoms,—Friele. Alaska,—Dall.

Cryptodon obesus Verrill.

Cryptodon obesus Verrill, Amer. Journ. Sci., iii, p. 287, pl. 7, fig. 2, 1872; Trans. Conn. Acad., iii, p. 11, pl. 1, fig. 11 (non G. O. Sars).

Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp. 509, 687, pl. 29, fig. 214, 1874 (auth. cop., p. 393).

Verrill, Proc. U. S. Nat. Mus., iii, p. 399, 1880.

The form figured under this name by G. O. Sars, is not the true *obesus*, but is more like a large *C. Gouldii*.

Jeffreys considers both this and *C. Gouldii* varieties of the European *C. flexuosus*. It may be so, but this form is at least as

well-defined as some of the other so-called species, recognized by him and others, in this genus.

The original specimens were from off Martha's Vineyard, 19 fathoms, and east of Block Island, in 29 fathoms, 1871. It has also been dredged by us, of smaller size, in Massachusetts Bay, Casco Bay, and off Nova Scotia. Off George's Bank, 430 fathoms!—(Smith and Harger, 1872.) Labrador! (coll. Packard.) Gulf of Mexico,—Dall.

Very large specimens of the typical *C. obesus*, several of them more than 15^{lines} broad, but mostly dead, were frequently dredged in 1880, off Newport, R. I., in 12 to 20 fathoms; and at stations 865–871, 873, 876, and 877, 878, in 65 to 192 fathoms, south of Martha's Vineyard and Newport, R. I. In 1881, it occurred at stations 918, 919, 949, 991, 1035, 1038, 1040, in 34 to 146 fathoms. It is most common in 20 to 100 fathoms, but a dead shell occurred at station 894, in 365 fathoms.

Cryptodon Sarsii (Phil.).

Axinus Sarsii M. Sars, Reise i Lofoten og Finmarken, 1849, Nyt. Mag. Naturvid., vi, [p. 48] (anatomy, etc.).

G. O. Sars, op. cit., p. 60, pl. 19, figs. 5 a, b.

Cryptodon Sarsii Verrill, Proc. U. S. Nat. Mus., iii, p. 399, 1880.

This is also regarded, by Jeffreys, as a variety of *C. flexuosus*.

A single large dead specimen of a shell agreeing very closely with this form, as figured by G. O. Sars, was dredged by our party, in 1879, off Cape Cod.

Cryptodon subovatus? (Jeff.) Verrill.

Axinus subovatus Jeffreys, Proc. Zool. Soc. London, 1881, p. 704, pl. 61, fig. 8.

An exceedingly thin, delicate and very inequilateral shell, apparently identical with the species described by Jeffreys, occurred at station 891, in 500 fathoms. One specimen.

Cryptodon ferruginosus (Forbes).

Axinus ferruginosus G. O. Sars, Moll. Reg. Arct. Norv., p. 63, pl. 19, figs. 10, a, b.

Cryptodon ferruginosus? Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 400, 1880.

Off Martha's Vineyard, living specimens were taken at many stations. They were nearly all thickly encrusted with iron-oxide, which adheres very tenaciously; beneath this crust the shell is usually much

eroded, and very thin, and in many cases the shell-substance itself has entirely disappeared, leaving only the crust of iron-oxide, lined, perhaps, by a remnant of the epidermis. These encrusted specimens are rough, and mostly nearly circular in outline.

Off Martha's Vineyard, stations 891-895, 941, 943, 947, 997, 999, 1028, in 153 to 500 fathoms. Off Chesapeake Bay, in 300 fathoms, station 898.

Gulf of St. Lawrence. Greenland. Finmark to Great Britain and Portugal. Mediterranean and Adriatic. Off the Azores. At various depths to 1012 fathoms. Fossil in the Miocene, Pliocene and Post-pliocene of Europe.

Montacuta fabagella (Conrad) Verrill.

Lepton fabagella Conrad, Marine Conch., p. 53, pl. 11, fig. 3, 1831.

Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, p. 688 (auth. cop., p. 394), 1874.

Rhode Island,—Conrad. I have no personal knowledge of this shell. It appears to be a species of *Montacuta*.

Montacuta Gouldii Thomson.

Thomson, Am. Journ. Conch., iii, p. 33, pl. 1, fig. 15, 1867.

I have not seen this species. Perhaps it is the same as *M. fabagella*.

Montacuta Dawsoni Jeffreys.

Jeffreys, British Conch., ii, p. 216; v, p. 178, pl. 31, fig. 7.

Newfoundland, coll. Verkrusen (t. Jeffreys).

Montacuta bidentata (Montagu).

G. O. Sars, op. cit, p. 69, pl. 19, figs. 17, *a*, *b* (*non* Gould.)

Long Island Sound, near New Haven, shore, 1868; Cape Cod Bay, 7 fathoms, 1879.

Montacuta ovata Jeffreys.

Proc. Zool. Soc., London, 1881, p. 698.

A few specimens of a species, which agrees well with this, were taken off Martha's Vineyard, in 100 to 153 fathoms, but, though living, they were all so much encrusted with iron-oxide that their identity is somewhat doubtful.

The same remark applies to an elongated ovate shell from the same region, resembling *M. (Tellinmya) ferruginosa*, to which I referred it, in a former paper. It may be identical with the last.

A shell, encrusted in the same way, dredged off Cape Cod, in 1874, was then identified as *Lasca rubra*, but I now doubt the correctness of that identification. The specimens are not at hand for further examination.

Venericardia borealis, var. *Novangliæ* (Morse).

Actinobolus (Cyclocardia) Nova-angliæ Morse, First Rep. Trustees Peabody Acad. Sci., p. 76, cut, 1869.

Cyclocardia Novangliæ Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp. 418, 684 (auth. cop., p. 390), pl. 29, fig. 215, 1874.

This appears to be only an inconstant variety of the common *V. borealis*, and has a range coëxtensive with the latter.

Leda unca Gould.

Leda unca Gould, Proc. Bost. Soc. Nat. Hist., viii, p. 282, 1862; Otia Conch., p. 239 (=? *Leda acuta* Conrad, described as fossil).

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; U. S. Nat. Mus., iii, p. 401, 1880 (description).

PLATE LVIII, FIGURE 41.

Mr. Dall has identified our shells with those taken in the Gulf of Mexico, by the "Blake" Expedition. He refers them to *L. Jamaicensis* D'Orbigny. I am not satisfied that this identification is correct, for D'Orbigny's figure is not very like our shells, of which we have taken large numbers.

Taken in abundance, alive and dead, at many of the stations, both south of Martha's Vineyard and south of Newport, R. I., in 85 to 155 fathoms, especially at stations 871, 873, 874 and 876, 1880. Additional localities, in 1881, were stations 921, 949, 951, 1058, in 65 to 219 fathoms.

Gulf of Mexico, 54 to 640 fathoms (t. Dall).

Leda pernula (Müller).

Leda pernula G. O. Sars, op. cit., p. 35, pl. 5, figs. 1, *a-d*.

Verrill, Proc. U. S. Nat. Mus., iii, p. 401, Jan., 1881.

A specimen that appears to be a typical example of this species was dredged by us in 1877, off Halifax, in 59 fathoms. Another was taken at station 1025, in 216 fathoms, off Martha's Vineyard, 1881.

Yoldia frigida Torell.

Yoldia frigida Torell, Spitz. Moll., p. 148, pl. 1, fig. 3, 1859.

G. O. Sars, Moll. Reg. Arct. Norv., p. 39, pl. 4, figs. 11, *a*, *b*.

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 401, 1881.

PLATE XLIV, FIGURE 2.

Gulf of Maine, 1873, and Jeffrey's Ledge, off the coast of Maine, in 88 to 92 fathoms, "Bache" 1874. Off Cape Cod, 106 fathoms, 1879. Off Martha's Vineyard, stations 880, 894, 943, 947, 997-999, in 153 to 365 fathoms. Gulf of St. Lawrence, 200 fathoms! (coll. Whiteaves).

Spitzbergen. Nova Zembla. Lofoten I. to the Mediterranean. Northern Japan (t. Jeffreys).

Arca ponderosa Say.

Arca ponderosa Say, Journ. Acad. Nat. Sci. Phil., ii, p. 267, 1822.

Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, p. 692 (auth. cop., p. 398), 1874.

Frequently found on the beach at Edgartown, Martha's Vineyard, and on the south side of Long Island, but it has not been found living north of Cape Hatteras. The beach shells may be from a submerged fossiliferous deposit, or it may possibly live in favorable localities, off shore.

Arca pectunculoides Scacchi, 1833.

Jeffreys, Brit. Conch., ii, p. 171; v, p. 175, pl. 30, fig. 3.

Verrill, Amer. Journ. Sci., v, p. 14, 1873.

G. O. Sars, op. cit., p. 43.

Arca grenophia Risso, 1826 (t. Jeffreys).

Arca glacialis Verrill, Proc. U. S. Nat. Mus., iii, p. 401, 1881 (? non Gray).

Variety, *grandis* Leche.

Öfversigt Svenska Exp. Novaja Semlja och Jenissej, 1875, 1876. Hafs-Mollusker, in K. Sv. Vet.-Akad. Handl., xvi, 2 [p. 30], pl. 1, figs. 9, *a-c*, 1878.

Variety, *septentrionalis* (G. O. Sars) Jeffreys.

Arca septentrionalis G. O. Sars, op. cit., p. 43, pl. 4, figs. 2, *a-c*.

Variety, **Frielei** (Jeffreys) Verrill.

Arca frielei (Jeff. MSS.) Frielo, Mag. Naturvid., xxiii, p. 2, 1877.

Jeffreys, Proc. Zool. Soc., London, 1879, p. 573, pl. 45, figs. 4, 4 a.

PLATE XLIV, FIGURES 5, 6.

This shell, as it occurs on our coast, is exceedingly variable in form and size. Our largest specimens are about 15^{mm} long. In outline it varies from an elongated oblong form, like fig. 5 (variety *grandis*) to a short-oblong (fig. 6); and from forms in which the anterior and posterior ends are nearly equally broad, to those in which the anterior end is very much narrowed, when the ventral edge becomes very oblique, and sometimes incurved, at the byssal notch. This elongated form, contracted anteriorly, is variety *septentrionalis*. It is one of the most abundant forms at most of the stations south of Martha's Vineyard, though forms intermediate, in various degrees, between this and the oblong-form (var. *grandis*) are equally abundant.

Another extreme variety is both short and oblique, combining the contraction of the anterior end with the shortening of the shell, so that the length is not greater than the distance from the dorsal to the ventral edge. In this form, the teeth are usually few, faint, and very oblique, confined to near the ends of the hinge-margin, and not uncommonly the teeth are nearly obsolete, and the shell is thinner and more delicate than usual, but the inner margin, as in the other varieties, is not crenulated. This form I regard as variety *Frielei*. It passes by insensible gradations into the variety *septentrionalis*.

In all these varieties the inner margin of the shell is plain, and the hinge-teeth are usually few and oblique, especially the posterior ones, which are more or less lamellose, sometimes running almost parallel with the hinge-plate. The median portion of the hinge-plate is destitute of teeth. The valves are more or less unequal in all the varieties, and are always finely decussated by slender, raised radiating ribs and concentric lines, while the epidermis is always, in fresh, living specimens, more or less pilose, the hairs arranged in radiating rows, along the ribs.

This shell attaches itself to pebbles or gravel-stones by a small, but strong, ventral byssus.

This species has been taken in numerous localities by the various dredging parties of the United States Fish Commission, since 1872: in the Bay of Fundy, 108 fathoms; off Casco Bay, 94 fathoms; Gulf of Maine, 110 to 150 fathoms; Cashe's Ledge, 27 to 90

fathoms; off Cape Cod, 94 to 122 fathoms; on George's and Le Have Banks; and off Halifax, Nova Scotia, at various depths, from 70 to 430 fathoms.

It is very common south of Martha's Vineyard, in 200 to 506 fathoms, and is less frequently dredged in 76 to 150 fathoms, those from the shallower stations being mostly dead, or young. It occurred at 32 stations in this region. It was particularly abundant at 894, in 365 fathoms; 938, in 310 fathoms; 939, in 258 fathoms; 997, in 335 fathoms.

Gulf of St. Lawrence! (coll. Whiteaves). Gulf of Mexico, "Blake" Exp. Greenland; Spitzbergen. Lofoten I. to the Mediterranean; 20 to 1170 fathoms.

Fossil in the Pliocene and Post-pliocene of Europe, in Norway, Italy, and France.

Variety *Frickei* was taken by the Valorous and Norwegian Arctic Expeditions, in 459 to 1333 fathoms. Forms apparently identical with the latter, occurred, with the other varieties, off Martha's Vineyard, in 192 to 487 fathoms, stations 869, 892, 895, 1880; 949, in 100 fathoms, 1881.

Arca pectunculoides, var. *crenulata* Verrill, nov.

Shell with a regularly crenulated inner margin, small, short, inflated, somewhat oblique, having nearly the outline of variety *Frickei*, defined above, but somewhat more tumid. The posterior end is regularly and circularly rounded; the ventral margin is broadly and somewhat obliquely rounded, the curvature being continuous to the dorsal angle; the dorsal edge is straight, with a distinct angle at each end, but both ends curve outward beyond the angles. Umbos swollen; beaks acute, curved inward and forward, not coming very near together, but leaving a deep and rather broad, well-defined ligamental and lunular area between and in front of them. Hinge-margin thin, straight, in the larger specimens with about 9 or 10 posterior, and 6 or 7 anterior teeth, which are well-defined, small, regular, not very oblique, and not laminar. Smaller examples have about 4 or 5 anterior and 6 or 7 posterior teeth. The hinge-margin is a little wider anteriorly, where denticulated, and the anterior teeth are somewhat larger than the posterior ones, and a little more oblique. The middle of the hinge-margin is edentulous and narrow, for a short distance, below the beaks. The posterior series of teeth is longer, and extends nearly to the beaks. The crenulations of the

inner margin are small, regular, and clearly defined, and extend all the way round to the dorsal angles; the inner surface of the shell is faintly radiated. The exterior is finely and regularly decussated by raised concentric lines and radiating ribs. The epidermis is pale horn-color, lamellose, rising into scales and points along the ribs. Length, 5^{mm}; beaks to ventral margin, 4^{mm}; thickness, 3.25^{mm}; length of dorsal margin, 3.6^{mm}.

Off Martha's Vineyard, stations 871, 873, 874, 876, and 949, in 85 to 120 fathoms. About 75 specimens.

Although resembling some of the other short varieties of *A. pectunculoides*, this seems to be a well-defined form, differing in the crenulated margin, and in the character of the hinge-teeth, as well as in its tumid form.

Arca glacialis Gray, 1824.

Arca glacialis Torell, Spitzbergens Mollusk fauna, p. 153, pl. 2, figs. 7 *a, b*, 1859.

G. O. Sars, op. cit., p. 43, pl. 4, figs. 1 *a-c*.

Leche, op. cit. [p. 29], pl. 1, fig. 8, 1878.

This species has been recorded from the Gulf of St. Lawrence, by Jeffreys.

The New England specimens, formerly referred by me to this species, are only large and elongated specimens of *A. pectunculoides*, but they agree very well with Sars' figures, except that the teeth are not quite so numerous. The differences seem to me varietal, rather than specific, in so variable a group as this. But as I am uncertain whether I have seen a "true" *A. glacialis*, I have let it stand in this paper.

Mr. Dall records it from the Gulf of Mexico, and thinks it distinct from *A. pectunculoides*, but he refers to the latter all the New England shells, that I have sent to him.

Limopsis minuta (Philippi).

Pectunculus (Limopsis) minutus Philippi, Enum. Moll. Sicil., p. 63, pl. 5, fig. 3, 1836 (t. Norinan).

Limopsis minuta G. O. Sars, Moll. Reg. Arct. Norv., p. 44, pl. 3, figs. 5 *a-c*.

Jeffreys, Proc. Zool. Soc. London, 1879, p. 585, pl. 46, fig. 9.

Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 402, Jan., 1881.

Limopsis borealis Jeffreys, Brit. Conch., ii, p. 164; v, p. 174, pl. 100, fig. 3.

Most of our specimens are rounder and more oblique than the figures of Sars and Jeffreys, but the form and degree of obliquity is variable.

This shell was taken in abundance, living, at stations 893, 894, 895, 925, 947, and 997, in 224 to 372 fathoms. It occurred less abundantly, at stations 870, 876, 880, 938, 939, 945, 946, 951, 953, 994, and 999, in 155 to 368 fathoms. In small numbers at 891, 892, 953, and 1028, in 410 to 715 fathoms. Dead shells occurred at several stations, in 93 to 130 fathoms.

Gulf of Mexico, 30 to 805 fathoms, Blake Exp. (t. Dall). On the European coast, from Finmark to the Azores and Mediterranean, in 70 to 790 fathoms. Cape of Good Hope (t. Jeffreys).

Fossil in the Miocene and Pliocene of Europe.

Limopsis cristata (?) Jeffreys.

Ann. and Mag. Nat. Hist., 1876, p. 434; Proc. Zool. Soc. London, 1879, p. 585, pl. 46, fig. 8.

Limopsis cristata? Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 402, 1880.

A few dead specimens, referred very doubtfully to this species, were taken at stations 865 to 867 and at 870 and 871, in 65 to 155 fathoms in 1880. No perfect living specimens have been noticed that seem certainly referable to it. In view of the great variability seen in our series, this form may very likely prove to be only a variety of *L. minuta*.

Gulf of Mexico, 640 fathoms, (t. Dall).

Modiola hamatus Verrill.

Mytilus hamatus Say, Journ. Acad. Nat. Sci. Philad., vol. ii, p. 265, 1822; Amer. Conch., Binney's ed., pp. 91, 204, pl. 50.

Modiola hamatus Verrill, Amer. Journ. Sci., iii, p. 211, pl. 7, fig. 3, 1872.

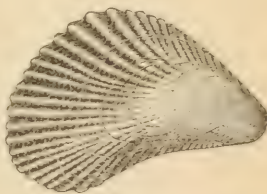
Verrill, Rep. Invert. Anim. Vineyard Id., in Rep. U. S. Fish Com., i, pp 374, 475, 693 (auth. cop., p. 399), 1874.

Verrill, Amer. Journal Sci., x, p. 372, 1875 (fossil).

FIGURE 10.

This species frequently occurs in summer, in considerable numbers, living on the oyster-beds in New Haven harbor and in Long Island Sound, adjacent, but it is probable that most of these specimens have been imported with the southern oysters, planted here in spring. It is not certain that it lives through the winter in this latitude. It is abundant from Cape Hatteras to the Gulf of Mexico.

FIG. 10.



It occurs abundantly, as a fossil, in the Post-pliocene beds of Nantucket Island; also at Provincetown, Mass. In the Miocene of Virginia and North Carolina.

Modiola polita Verrill and Smith.

Modiola polita Verrill and Smith, in Verrill, Amer. Journ. Sci., xx, pp. 392, 400, Nov., 1880; Verrill, Proc. U. S. Nat. Mus., iii, p. 402, Jan., 1881.

Dall, Bulletin Mus. Comp. Zool., ix, p. 116, 1881.

? *Mytilus luteus* Jeffreys, French Expl. in Bay of Biscay, in Rep. Brit. Assoc., 1880 (no description); Ann. and Mag. Nat. Hist., Oct., 1880, p. 315 (no description).

Mr. Dall has compared his specimens with our original types.

Two living specimens were taken at station 895, in 238 fathoms. Gulf of Mexico, 339 fathoms, "Blake" Exp. (t. Dall). Bay of Biscay,—Jeffreys.

Mr. Dall thinks that *M. luteus* is certainly identical with this species, judging from a recent description in Journ. de Conch., which I have not seen. Our description has priority of publication.

If the genus *Modiola* is not to be considered valid, this species should be called *mytilus politus*.

Crenella decussata (Montagu) Macgillivray, 1843.

Modiola ? cicercula Möller, Krøyer's Tidsskr., iv, p. 92, 1842.

Crenella decussata Lovén, Ind. Moll. Scand. Occid., p. 32, 1846.

Jeffreys, Brit. Conch., ii, p. 133; v, pl. 28, fig. 6.

Verrill, Amer. Journ. Sci., vol. vi, p. 440, 1873; vol. vii, pp. 409, 412, 1874.

G. O. Sars, op. cit., p. 31, pl. 3, figs. 4, *a*, *b*, 1878.

PLATE XLIV, FIGURE 7.

This species has been taken in many localities, on muddy bottoms, by the U. S. Fish Com., on the northern coasts of New England. Grand Menan, 3 to 10 fathoms, 1872; Casco Bay, 10 to 20 fathoms, 1873; off Martha's Vineyard, stations 865-7, 871, 949, 950, in 64 to 115 fathoms.

Gulf of Mexico, "Blake" Exp. (t. Dall). Gulf of St. Lawrence! (coll. Whiteaves). Greenland; Iceland; Nova Zembla; Spitzbergen. From Finnmark and Lapland to Great Britain and the Mediterranean. Northwest coast of America. Corea, 35 to 40 fathoms (t. Jeffreys). It occurs from low-water mark to 1750 fathoms.

Fossil in the Pliocene and Post-pliocene of Europe.

Dacrydium vitreum (Möller) Torell.

Modiola ? vitrea Möller, Ind. Moll. Grönl., in Krøyer's Tidsskr., iv, p. 92, 1842.

Dacrydium vitreum Torell, Spitz. Mollusk fauna, p. 139, pl. 1, figs. 2, *a, b*, 1859.

G. O. Sars, op. cit., p. 28, pl. 3, figs. 2, *a, b*.

Verrill, Amer. Journ. Sci., vi, p. 440, 1873; vii, p. 409, 1874.

PLATE XLIV, FIGURES 8, *8a*.

First taken, on our coast, by the Fish Com., in 1873 and 1874, in 60 to 142 fathoms, off the coast of Maine and off Cape Cod. Gulf of Maine, 160 fathoms; and off Nova Scotia, 102 fathoms, 1877; off Cape Cod, 106 and 118 fathoms, 1879. South of Martha's Vineyard, in 312 to 500 fathoms, stations 891, 892, 894, 947, 994, 997; off Chesapeake Bay, station 898, in 300 fathoms.

North Atlantic, 1450 fathoms,—Valorous Exp. Greenland; Nova Zembla; Spitzbergen, 30 to 40 fathoms,—Torell. Finnmark and Lofoten I. to the coasts of Ireland, England, Spain, and the Azores, 164 to 2435 fathoms. Mediterranean, 30 to 600 fathoms. Has been taken in 30 to 2750 fathoms.

Idas argenteus Jeffreys.

Annals and Mag. Nat. Hist., Nov., 1876, p. 428; Proc. Zool. Soc. London, 1879, p. 570, pl. 45, fig. 3.

Variety?, **lamellosus** Verrill. (Perhaps sp. nov.)

Several living specimens of a species of *Idas* were taken by us. Our shell resembles *I. argenteus* in form and most other characters, but there are no radiating lines, such as are attributed to that species; but the surface is covered with well-marked, thin, distant, concentric, raised lamellæ, most distinct anteriorly.

The shell is thin, translucent, covered with a yellowish epidermis; umbos and hinge reddish brown; inner surface iridescent. Some of the specimens have several horny, sharp, stiff, beard-like processes projecting from the posterior and dorsal surfaces. One of the largest specimens is 5.5 long; greatest height, 2.2^{mm}.

Station 997. in 335 fathoms.

North Atlantic and Bay of Biscay, 1450 and 994 fathoms,—Jeffreys.

Our shells resemble, in form, the young of *Saxicava rugosa*.

Limæa subvota (Jeffreys).

Lima subovata Jeffreys, *Annals and Mag. Nat. Hist.*, Nov., 1876, p. 427; *Proc. Zool. Soc. London*, 1879, p. 563, pl. 45, fig. 2.

Limæa subovata Verrill, *Amer. Journ. Sci.*, xx, p. 392, Nov., 1880; *Proc. U. S. Nat. Mus.*, iii, p. 402, Jan., 1881.

Off Martha's Vineyard, stations 880, 891 to 894, 947, 994, 997 to 999, in 252 to 500 fathoms, common; dead shells at station 949, in 100 fathoms.

North Atlantic, 1450 fathoms,—“Valorous” Exp.; Shetland and Färöe Is., 125 to 542 fathoms; west of Ireland, 664 to 1443 fathoms; off Azores, 1000 fathoms (t. Jeffreys). Mediterranean,—Monterosato.

Pecten glyptus Verrill, sp. nov.

Pecten, sp., near *opercularis* Verrill, *Proc. Nat. Mus.*, iii, p. 403, 1881.

Shell large, rather thin, compressed, both valves a little convex, the lower one a little flatter; ventral margin evenly rounded; the dorsal edges are nearly straight and meet at rather more than a right angle; ears rather large, the anterior one with a triangular notch, beyond which the end is rounded to the dorsal angle; surface with eight or more unequal ribs; posterior one triangular, truncated at the end, with three or four thin ribs. Surface of the valves with about seventeen or eighteen large triangular ribs, separated by wider, broadly concave interspaces. The whole surface, both of the ribs and interspaces, is regularly covered with fine, radiating, raised lines; the interspaces between these are crossed by very regular, concentric scallops, formed by thin, raised lines. On the lower valve there are similar large radiating ribs, but the fine radii and concentric scallops are obsolete.

Color, of the upper valve, orange brown, paler between the ribs.

Diameter, more than 2 inches (50^{mm}). The larger specimens are all fragmentary; on some of these the distance from the crest of one rib to another is 7^{lines}.

Off Martha's Vineyard, stations 871, 873, 874, 876, 949, in 85 to 120 fathoms.

Pecten vitreus (Chemnitz).

Pecten vitreus Lovén, *Ind. Moll. Scand. Occid.* [p. 31], 1846 (description).

G. O. Sars, *op. cit.*, p. 21, pl. 2, figs. 5, *a*, *b*.

Verrill, *Amer. Journ. Sci.*, xvi, p. 378, 1878.

Variety, **abyssorum** (M. Sars).

Pecten abyssorum Lovén; G. O. Sars, op. cit., p. 22, pl. 2, figs. 6, *a-c*.

PLATE XLII, FIGURE 21.

The variety *abyssorum* differs only in being smoother, with the scales more or less obsolete; both forms occur together.

South of Martha's Vineyard this species has been taken in considerable numbers, and at thirty stations it was living and attached to various objects, above the bottom, but chiefly to the gorgonian coral, *Acanella Normani* V., which is very abundant in this region. This shell occurred, living, at all depths, from 100 to 506 fathoms. It was particularly abundant at station 894, in 365 fathoms, and at 1029, in 458 fathoms. Dead valves were taken in 64 to 100 fathoms.

The halibut fishermen of Gloucester, Mass., have given many specimens of this species to the U. S. Fish Commission. These were taken on the fishing banks off Nova Scotia, and on the Grand Bank, where it mostly occurs adhering to gorgonian corals: *Primnoa reseda*, *Paragorgia arborea*, *Acanella Normani*, *Keratoisis ornata* V., etc. It is often gregarious.

Arctic Ocean, generally; Greenland; Iceland. Northern Norway south to France, Portugal, Madeira, and the Mediterranean. West Patagonia (t. Jeffreys).

Pecten Grönlandicus Sowerby, 1845.

G. O. Sars, op. cit., p. 23, pl. 2, figs. 4, *a-c*.

Gulf of St. Lawrence! (coll. Whiteaves). Arctic Ocean; Greenland; Spitzbergen; Lapland; northern Norway. N. of Scotland; W. of Ireland; off the Bay of Biscay, in 358 to 630 fathoms,—Jeffreys.

Pecten Hoskynsi Forbes.

Pecten Hoskynsi Forbes, Rep. Brit. Assoc., for 1843, pp. 188, 192, 1844 (description very short and indefinite).

Wyville Thomson, Depths of the Sea, p. 465 (wood-cut, 79, no description).

Pecten imbrifer Lovén, Ind. Moll. Scand. Occid. [p. 31], 1846 (description).

Amussium Hoskynsi Jeffreys, Proc. Zool. Soc. London, p. 562, 1879.

PLATE XLIV, FIGURE 11.

Variety, **pustulosus** Verrill

Pecten pustulosus Verrill, Amer. Journ. Sci., v, p. 14, 1873; Trans. Conn. Acad., iii, p. 50 (description).

Pecten Hoskynsi G. O. Sars, op. cit., p. 20, pl. 2, figs. 1, *a-d*, 1878.

PLATE XLII, FIGURES 22, 22a.

The original specimens of var. *pustulosus* V. were from south of George's Bank, 430 fathoms, and Gulf of Maine, 150 fathoms, 1872. It was afterwards dredged by us, in 1877, in the Gulf of Maine, 115 fathoms, and off Nova Scotia, in 190 fathoms, associated with the non-pustulose form.

South of Martha's Vineyard it occurred at stations 876, 880, 881, 894, 947, 1038, in 120 to 365 fathoms, but only sparingly, and mostly dead.

Greenland; Spitzbergen; Jan Mayen I.; Nova Zembla.* Northern Norway to the Azores and Mediterranean, in deep water, 30 to 650 fathoms.

Although this species is referred to *Amussium* by Mr. Jeffreys, our specimens do not have the internal ribs, regarded as the special character of this genus.

***Amussium fenestratum* (Forbes) Jeffreys.**

Jeffreys, Proc. Zool. Soc. London, 1879, p. 561.

Pecten fenestratus Forbes, Rep. Brit. Assoc., for 1843, pp. 146, 192, 1844.

Verrill, Proc. Nat. Mus., iii, p. 403, Jan., 1881 (description).

Pecten inequisculptus Tiberi (t. Jeffreys).

The upper valve is elegantly decussated, the lower one is concentrically lamellose. The upper valve is variously colored with beautiful tints of red, purple, brown and yellow, usually mottled.

This elegant species has been dredged, living, at several stations off Martha's Vineyard, in 86 to 310 fathoms. It was most numerous at stations 949 and 1040, in 100 and in 93 fathoms.

It occurs on the European coasts, off Portugal, and in the Mediterranean Sea; from 50 to 250 fathoms; a variety from 2435 fathoms (t. Jeffreys).

***Avicula hirundo* (Linné).**

Avicula hirundo Jeffreys, Brit. Conch., ii, p. 99, pl. 3, fig. 1; v, pl. 26.

Variety, ***nitida*** Verrill.

Avicula hirundo? var. *nitida* Verrill, Amer. Journ. Sci., xx, p. 392, Nov., 1880; Proc. U. S. Nat. Mus., iii, p. 402, Jan., 1881.

PLATE LVIII, FIGURE 43.

Some of our largest specimens agree well with the European forms figured by Jeffreys, and are conspicuously scaly. The largest are about 50^{mm} in the greatest diameter.

The variety is nearly smooth and somewhat lustrous (fig. 43). The largest is 42^{mm} in the longest diameter; hinge margin 36^{mm}.

This shell was found in considerable numbers adhering to hydroids, in 65 to 192 fathoms, south of Martha's Vineyard, at stations 865 to 867, and 869 to 873, in 1880; and at 949, 950, in 69 to 100 fathoms, 1881.

Southern England to the Azores, Canary Islands, and the Mediterranean.

EXPLANATION OF PLATES.

I am indebted to Professor S. F. Baird for permission to use in this place some of the drawings prepared for the illustration of the reports of the U. S. Fish Commission. They were mostly drawn from nature by Mr. J. H. Emerton, under the immediate direction of the author. Unless otherwise specially stated, they are from New England specimens. All are from the eastern coast of New England and Canada.

PLATE XLII.

- Figure 1.—*Marsenina glabra* V., p. 517, front view, x 2½ diameters.
 Figure 1a—The same. Dorsal view. Eastport, Me., 1864.
 Figure 2.—*Mursenina prodita*, p. 518, front view, x 2½ diameters.
 Figure 2a—The same. Dorsal view. Eastport, Me., 1868.
 Figure 3.—*Marsenina ampla* V., p. 518, front view, x 2¼ diameters.
 Figure 3a—The same. Dorsal view. Eastport, Me., 1868.
 Figure 4.—*Marsenina glabra*, ♀, p. 517, ventral view of the living animal, x 3 diameters. Eastport, Me.
 Figure 5.—*Torellia vestita*, p. 521, front view, x 2½ diameters. Gulf of Maine.
 Figure 6.—*Lacuna glacialis*, p. 522, front view, x 2½ diameters. Gulf of St. Lawrence.
 Figure 7.—*Cerithiella Whitearsii* V., p. 522, x 6½ diameters. Gulf of St. Lawrence.
 Figure 8.—*Cingula Jan-Mayeni*, p. 524, x 10 diameters. Gulf of St. Lawrence.
 Figure 9.—*Lunatia nana*, p. 516, x 2½ diameters. Side view, from life. No. 1266.
 Figure 10.—*Scyllaea Edwardsii* V., p. 550, ½ natural size.
 Figure 11.—*Issa lacera*, p. 547, dorsal view, from life; about natural size.
 Figure 12.—*Acanthodoris ornata* V., p. 549, dorsal view, from life; more than natural size. Eastport, Me.
 Figure 13.—*Idaliella pulchella*, p. 548, side view, natural size, from life. Salem, Mass.
 Figure 14.—*Coryphella Stimpsoni* V., p. 552, ventral view of head and anterior part of body, from life, enlarged about 2 diameters. Eastport, Me.
 Figure 15.—*Coryphella nobilis* V., p. 552, two rows of teeth of the radula; much enlarged.
 Figure 16, a, b.—*Dentalium occidentale* St.: a, aperture; b, side view of a young example, x 5 diameters.

- Figure 17.—The same. Side view of another specimen, of the many-ribbed variety, x 6 diameters.
- Figure 18.—The same. Side view of a larger specimen, of a more curved variety, with fewer and stronger ribs, x 2 diameters.
- Figure 19.—*Siphonodentalium vitreum*, p. 557, side view of a large specimen with the apical denticles, or lobes, broken off, x $4\frac{1}{2}$ diameters.
- Figure 20, *a*, *b*.—*Siphonentalis affinis*, p. 558, aperture, *a*; and side view, *b*, x 5 diameters. Halifax, N. S.
- Figure 21.—*Pecten vitreus*, p. 581, lower side, natural size. Specimen from off Nova Scotia.
- Figure 22.—*Pecten Hoskynsi*, var. *pustulosus*, p. 581, upper side of one of the type-specimens from Gulf of Maine, 150 fathoms. Enlarged a little more than two diameters.
- Figure 22*a*.—The same. Lower side.
- Figure 10, drawn from life, and figs. 16 and 17, camera-drawings, are by the writer; the rest are by J. H. Emerton.
- Several of the numbers on this plate, indicating the amount of enlargement, are erroneous. *

PLATE XLIII.

- Figure 1.—*Cingula castanea*, p. 525, x 16 diameters.
- Figure 2.—*Cingula areolata*, p. 524, x 14 diameters.
- Figure 3.—*Cingula globulus*, p. 524, x 16 diameters. From Gulf of St. Lawrence.
- Figure 4.—*Buccinum tenue*, p. 495, small specimen, natural size; from off Cape Sable, N. S.
- Figure 5.—*Buccinum cyaneum*, p. 492, natural size; from off Cape Sable, N. S.
- Figure 6.—*Sipho pubescens* V., p. 501, small specimen, natural size; from off Cape Sable, N. S.
- Figure 7.—*Anachis costulata*, p. 513, x about 4 diameters.
- Figure 8.—*Trophon clathratus*, var. *Gunneri*, p. 512, somewhat enlarged. The outer lip is broken.
- Figure 9.—*Pleurotomella Packardii* V. ♂, p. 453, from the original type-specimen, x 2 diameters. The shell is so turned that the lip partially conceals the aperture, in order to show the notch in the lip.
- Figure 10.—*Bela cancellata*, p. 475, slender variety, not full grown, x 4 diameters.
- Figure 11.—The same. Typical form, x 4 diameters.
- Figure 12.—*Bela incisula* V., p. 461, x 4 diameters.
- Figure 13.—*Bela decussata*, p. 479, typical form, x 4 diameters. The outer lip is somewhat broken.
- Figure 14.—*Bela harpularia*, p. 473, typical form, from off Cape Cod, x 4 diameters.
- Figure 15.—*Bela concinnula* V., p. 468, typical form, x 4 diameters. The outer lip is somewhat broken off.
- Figure 16.—*Bela Pingelii*, p. 464, x 4 diameters. Eastport, Me.

PLATE XLIV.

- Figure 1.—*Yoldia lucida*, x 6 diameters. From a variety more narrowed posteriorly than usual.
- Figure 2.—*Yoldia frigida*, p. 573, x 8 diameters.

- Figure 3.—*Poromya granulata*, p. 564, typical form, interior view, x 4 diameters. Gulf of Maine.
- Figure 4.—The same. Outside of left valve.
- Figure 5.—*Arca pectunculoides*, var. *grandis*, p. 574, x 4 diameters. Gulf of Maine.
- Figure 6.—*Arca pectunculoides*, p. 574, short, oblong form, x 4 diameters.
- Figure 7.—*Crenella decussata*, p. 578, x 12 diameters.
- Figure 8.—*Dacrydium vitreum*, p. 579, x 15 diameters.
- Figure 8a.—The same. Hinge, left valve.
- Figure 9.—*Xylophaga dorsalis*, p. 559, x 6 diameters. Casco Bay.
- Figure 10a.—*Nevera glacialis*, p. 562, large form, with cartilage pit as in *N. arctica*, x $2\frac{3}{4}$ diameters.
- Figure 10b.—The same. Commonest variety.
- Figure 10c.—*Nevera obesa*, p. 563, a common variety, x $2\frac{3}{4}$ diameters. Gulf of Maine.
- Figure 11.—*Pecten Hoskynsi*, p. 581, typical form, x 4 diameters. From off Nova Scotia, 190 fathoms.

PLATE LVII.

- Figure 1.—*Pleurotoma Dalli*, p. 451, x $1\frac{1}{2}$.
- Figure 1a.—The same.
- Figure 2.—*Pleurotoma Carpenteri*, p. 452, x 4.
- Figure 3.—*Pleurotomella Agassizii*, p. 454, x $1\frac{1}{2}$.
- Figure 3a.—The same. Uncini, x 250.
- Figure 4.—*Pleurotomella Pandionis*, p. 456, natural size.
- Figure 4a.—The same. Uncini, x 75.
- Figure 5.—*Pleurotomella Packardii*, ♂, p. 453, uncini from the original specimen, x 250.
- Figure 6.—*Bela Gouldii*, p. 463, x 3.
- Figure 6a.—*Bela Gouldii*, p. 465, uncini, x 75.
- Figure 7.—*Bela hebes* V., p. 459, x 4.
- Figure 8.—*Bela pygmaea* V., p. 460, x 6.
- Figure 9.—*Bela hircularia*, p. 473, animal, natural size.
- Figure 10.—*Bela concinnula*, var. *acuta*, p. 470, uncini, x 75.
- Figure 11.—*Bela concinnula*, p. 468. (Mass. Bay, sta. 287), uncini, x 75.
- Figure 12.—*Bela scalaris*, with animal, p. 471, Casco Bay, natural size.
- Figure 12a.—*Bela scalaris*, p. 471, ♂, uncini (sta. 293), x 75.
- Figure 13.—*Bela cancellata*, p. 475, uncini, x 75.
- Figure 14.—*Bela incisula*, uncini, x 125.
- Figure 16 and 16a.—*Bela bicarinata*, p. 481, Eastport. 1870, x 3.
- Figure 17.—*Turanis pulchella* V., p. 487, shell. Original type, x 14.
- Figure 18.—*Turanis Mörchii*, p. 486, shell, x 6.
- Figure 19.—*Sipho calafus*, p. 506, shell, x 3.
- Figure 19a.—The same. Radula, x 75.
- Figure 20.—*Sipho parvus*, p. 504, shell, x 3.
- Figure 20a.—The same. Part of radula, x 75.
- Figure 20b.—The same. Operculum.
- Figure 21.—*Sipho pygmaeus*, ♂, radula, x 75.
- Figure 22.—*Sipho glyptus*, p. 505, radula, x 75.
- Figure 23.—*Sipho Sabini* Gray, p. 503, apical whorls, x 6.

- Figure 24.—*Sipho Stimpsonii*, young, x 4.
 Figure 25.—*Sipho pubescens*, p. 501, young, x 4.
 Figure 26.—*Calliostoma Bairdii*, with animal, p. 530, natural size.
 Figure 27.—*Torellia fimbriata*, ♂, p. 520, x $1\frac{1}{2}$.
 Figure 27a.—The same, ♂. Radula, x 22.
 Figure 28.—*Fossarus latericeus*, x 6.
 Figure 29.—*Solarium boreale*, p. 529, young, x 4.
 Figure 30.—The same. Adult, x 2.
 Figure 31.—*Aclis gracilis* V., p. 528, x 6.
 Figure 32.—*Scalaria Pourtalesii*, p. 527, x 2.
 Figure 33.—*Scalaria Dalliana*, p. 527, x 4.
 Figure 34.—*Scalaria Leeana*, p. 526, x 4.
 Figure 35.—*Scalaria* (*Opalia*) *Andrewsii*, p. 526, x 4.
 Figure 36.—*Aclis Walleri*, p. 528, x 6.
 Figure 37.—*Margarita regalis*, p. 530, x 2.
 Figure 38.—*Margarita lamellosa*, p. 530, x 6.
 Figure 39.—*Cyclostrema Dalli*, p. 532, x 8.

PLATE LVIII.

- Figure 1.—*Sipho glyptus* V., p. 505, the shell. Enlarged $1\frac{1}{2}$ diameters.
 Figure 1a.—The same. Apical whorls, enlarged.
 Figure 2.—*Astiris diaphana* V., p. 513, x 3.
 Figure 3.—*Lamellaria pellucida*, var. *Gouldii* V., ♀, p. 518, ventral view of the living animal, x $1\frac{1}{2}$.
 Figure 4.—*Lamellaria pellucida* V., ♂, p. 518, ventral view of the living animal, x $1\frac{1}{2}$.
 Figure 5.—The same. The shell, front view, x 2.
 Figure 5a.—The same. Part of radula, much enlarged.
 Figure 6.—*Cingula harpa* V., p. 523, the shell, x 6.
 Figure 7.—*Assiminea Grayana* Leach, p. 525, dorsal view of the animal and shell, much enlarged.
 Figure 8.—*Truncatella truncatula*, p. 525, dorsal view of the living animal, enlarged.
 Figure 8a.—The same. Adult shell, with truncated apex, x 4.
 Figure 8b.—The same. Young shell, x 4.
 Figure 9.—*Buccinum Sandersoni* V., p. 490, apical whorls, x 4.
 Figure 10.—*Buccinum undatum* Linné. Apical whorls, x 4.
 Figure 11.—*Buccinum cyaneum* Brug., p. 492, apical whorls, x 4.
 Figure 12.—*Nassa nigrolabra* V., p. 512, the shell, x 8.
 Figure 13.—*Aclis striata* V., p. 528, the shell, x 6.
 Figure 14.—*Turbonilla Emertoni* V., p. 536, the shell, x 6.
 Figure 14a.—The same. Apical whorls, x about 30.
 Figure 15.—*Turbonilla Rathbuni* V. and S., p. 536, the shell, x 3.
 Figure 16.—*Turbonilla Bushiana* V., p. 537, the shell, x 3.
 Figure 17.—*Menestho sulcata* V. The shell, x 8.
 Figure 18.—*Eulimella Smithii*, p. 538, the shell, x 4.
 Figure 19.—*Aclis tenuis* V., p. 528, the shell, x 7.
 Figure 20.—*Eulima intermedia*, p. 535, the shell, x 6.
 Figure 21.—*Acteon nitidus* V., p. 540, the shell, x 4.

- Figure 22.—*Diaphana gemma* V., p. 543, the shell, x 6.
- Figure 23.—*Philine amabilis* V., p. 544, animal from life, $\frac{3}{4}$ natural size.
- Figure 24.—The same, p. 544, the shell, x 2.
- Figure 25.—*Diaphana conulus*, p. 543, the shell, x 8.
- Figure 26.—*Pleurobranchæa tarda* V., p. 546, $\frac{1}{2}$ natural size.
- Figure 27.—*Choristes elegans* Carp., var. *tenera* V., p. 541, the shell, x 4.
- Figure 27a.—The same. Part of radula.
- Figure 28.—*Choristes elegans* Carp., p. 542, typical fossil shell. Young, x 4.
- Figure 29.—*Lepetella tubicola* V., p. 534, side view of shell, x 6.
- Figure 29a.—The same. Apex, much enlarged.
- Figure 30.—*Cadulus Pandionis* V. and S., p. 558, the shell, x 3.
- Figure 30a.—The same. Anterior end to show the aperture, x 3.
- Figure 31.—*Cadulus propinquus*, p. 558, the shell, x 6.
- Figure 32.—The same. More slender form, x 6.
- Figure 33.—*Cymbulia calceolus* V., p. 553, animal, $\frac{1}{2}$ natural size.
- Figure 34.—*Doris complanata* V. and E., p. 549, ventral view of the animal, in life, $\frac{1}{2}$ natural size.
- Figure 34a.—The same. One of the tentacles, enlarged.
- Figure 34b.—The same. Gills, partly retracted.
- Figure 35.—*Heterodoris robustus* V. and E., p. 549, side view of specimen a short time in alcohol. Natural size.
- Figure 35a.—The same. Part of two rows of teeth of radula.
- Figure 35b.—The same. Two of the lateral teeth, side view, more enlarged.
- Figure 36.—*Issa ramosa* V. and E., p. 547, dorsal view of living animal, x 2.
- Figure 36a.—The same. Somewhat more than half of two rows of teeth.
- Figure 37.—*Pholadomya arata* V. and S., p. 567, side view. Natural size.
- Figure 38.—*Mytilimeria flexuosa* V. and S., p. 567, side view. Natural size.
- Figure 39.—*Neæra rostrata*, p. 562, side view, x 2.
- Figure 40.—*Neæra multicosata* V. and S., p. 559, side view, x 2.
- Figure 41.—*Leda unca* Gould, p. 572, interior of left valve, x 3.
- Figure 42.—*Diplodonta turgida* V. and S., p. 569, interior of right valve. Natural size.
- Figure 43.—*Avicula hirundo*, var. *nitida* V., p. 582, a young specimen attached to hydroid, x 2.

ERRATA.

Page 499, lines 14 and 17, for *pagurus*, read *pagmeta*.

Page 501, line 4 of note, for *Bernicensis*, read *Berniciensis*.

Page 504, line 22, for lamallæ, read lamellæ.

Page 507, end of line 10, of note, for *i*, read ,.

Page 511, line 12, for Pettit, read Petit.

Page 512, line 3 from bottom, for *scalariforme*, read *scalariformis*.

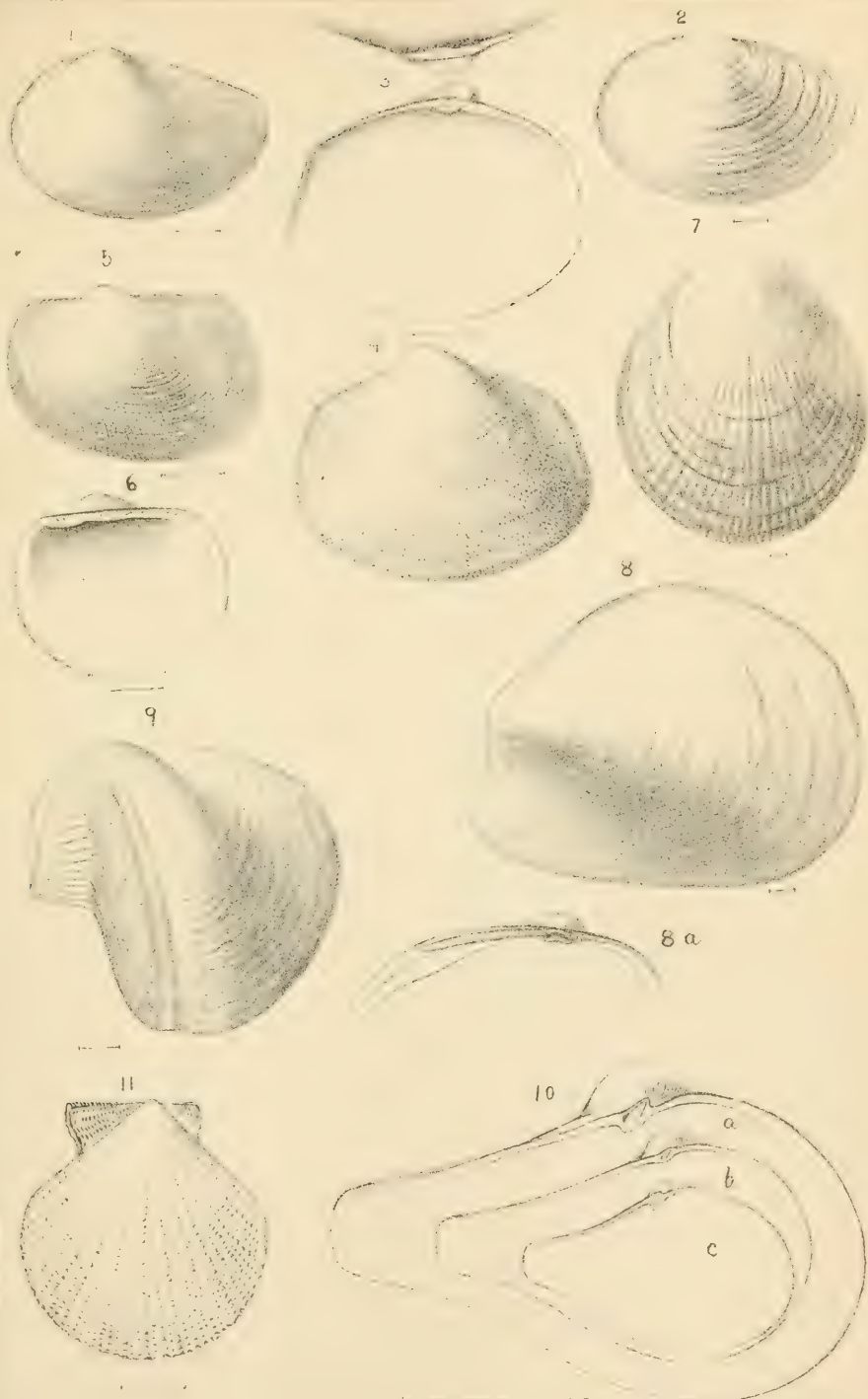
Page 537, line 5 from bottom, for *equalis*, read *æqualis*.

Page 580, line 1, for *subvota*, read *subovata*.

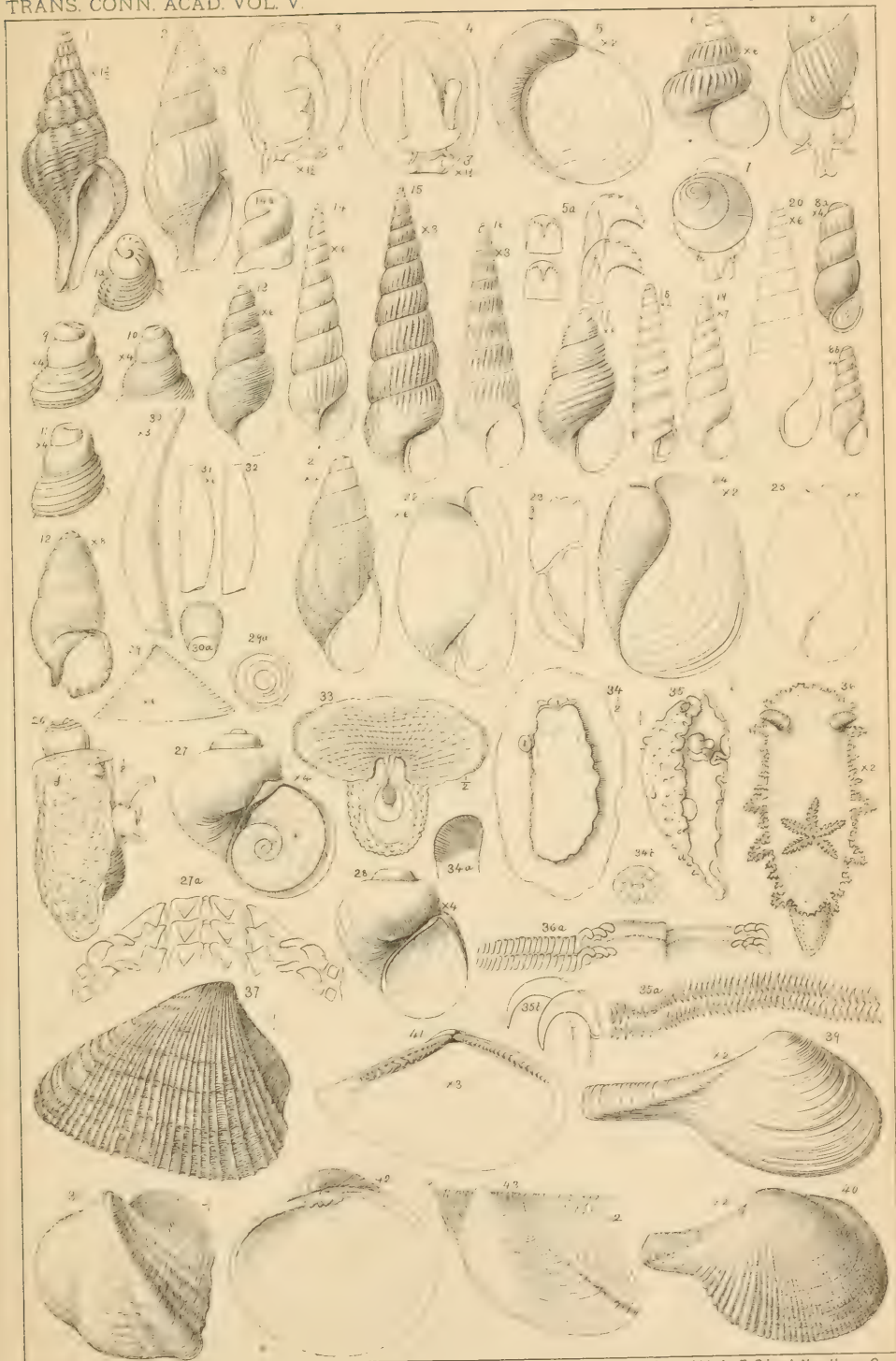
Plate XLII, for correct numbers indicating amount of amplification, see pp. 583, 584.







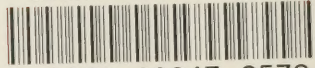








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